

AD-A144 666

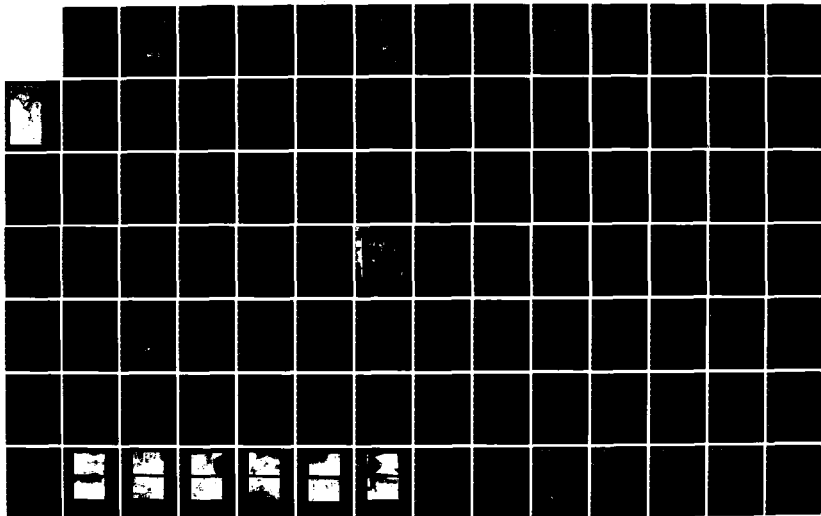
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
MESSERSCHMIDT POND DA. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV NOV 79

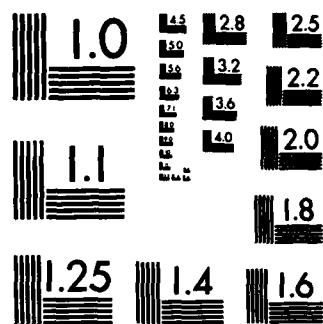
1/2

UNCLASSIFIED

F/G 13/13

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

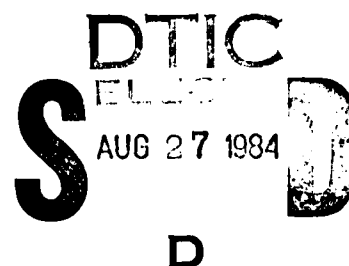
AD-A144 666

DTIC FILE COPY

CONNECTICUT RIVER BASIN
WESTBROOK, CONNECTICUT

**MESSERSCHMIDT POND DAM
CT 00392**

**PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**



**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154**

NOVEMBER, 1979

DISTRIBUTION STATEMENT A
Approved for public release;
Distribution Unlimited

84 08 20 063

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00392	2. GOVT ACCESSION NO. AD A144666	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Messerschmidt Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE November 1979
		13. NUMBER OF PAGES 90
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Connecticut River Basin Westbrook, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The project has a total length of 610+ feet and consists of an earthfill dam, a principal spillway and two auxiliary spillways. Based upon the visual inspection and past performance, the project is judged to be in poor condition. In accordance with Corps of Engineers Guidelines for size (Small) and hazard (High) classification for the dam, the test flood will be equivalent to the Probable Maximum Flood.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02154

REPLY TO
ATTENTION OF
NEDED-E

JUN 04 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Messerschmidt Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. The report is based upon a visual inspection, a review of past performance, and a preliminary hydrological analysis. A brief assessment is included at the beginning of the report.

The preliminary hydrologic analysis has indicated that the spillway capacity for the Messerschmidt Pond Dam would likely be exceeded by floods greater than 12 percent of the Probable Maximum Flood (PMF), the test flood for spillway adequacy. Our screening criteria specifies that a dam of this class which does not have sufficient spillway capacity to discharge fifty percent of the PMF, should be adjudged as having a seriously inadequate spillway and the dam assessed as unsafe, non-emergency, until more detailed studies prove otherwise or corrective measures are completed.

The term "unsafe" applied to a dam because of an inadequate spillway does not indicate the same degree of emergency as that term would if applied because of structural deficiency. It does indicate, however, that a severe storm may cause overtopping and possible failure of the dam, with significant damage and potential loss of life downstream.

It is recommended that within twelve months from the date of this report the owner of the dam engage the services of a professional or consulting engineer to determine by more sophisticated methods and procedures the magnitude of the spillway deficiency. Based on this determination, appropriate remedial mitigating measures should be designed and completed within 24 months of this date of notification. In the interim a detailed emergency operation plan and warning system should be promptly developed. During periods of unusually heavy precipitation, round-the-clock surveillance should be provided.

NEDED-E

Honorable Ella T. Grasso

I have approved the report and support the findings and recommendations described in Section 7, with qualifications as noted above. I request that you keep me informed of the actions taken to implement these recommendations since this follow-up is an important part of the non-Federal Dam Inspection Program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. This report has also been furnished to the owner of the project, Mr. Charles Messerschmidt, Jr., Westbrook, Connecticut.

Copies of this report will be made available to the public, upon request to this office, under the Freedom of Information Act, thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for the cooperation extended in carrying out this program.

Sincerely,

Max B. Scheider

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A/1	



CONNECTICUT RIVER BASIN
WESTBROOK, CONNECTICUT
MESSERSCHMIDT POND DAM
CT 00392

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

NOVEMBER, 1979

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

DTIC
ELECTE
AUG 27 1984
S D

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

Name of Dam:	Messerschmidt Pond Dam
Inventory Number:	000392
State Located:	Connecticut
Town Located:	Westbrook
Stream:	Falls River
Owner:	Charles Messerschmidt
Date of Inspection:	September 18, 1979
Inspection Team:	Peter M. Heynen, P.E.
	Miron Petrovsky
	Jay Costello
	Hector Moreno, P.E.

The project, built in 1890, has a total length of 610+ feet and consists of an earthfill dam, a principal spillway and two auxiliary spillways. The dam has 545+ feet of embankment which is arranged in a horseshoe configuration, and impounds 910 acre-feet of water with the pond level to the top of the low section of the left embankment. The central and right embankments are 26+ feet above the streambed of Falls River and the left embankment is 24+ feet above the streambed. The principal spillway is a 63+ foot masonry weir located between the central and left sections of embankment (See Sheet B-1). A masonry corewall extends from the right spillway training wall into the central embankment. The dam is approximately 15+ feet wide at the crest.

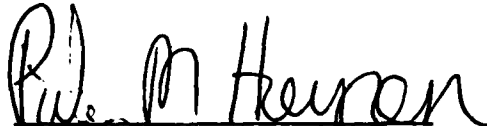
The outlet facilities are a 10 foot by 5 foot concrete sluice to a turbine and tailrace in a powerhouse and factory located adjacent to the principal spillway.

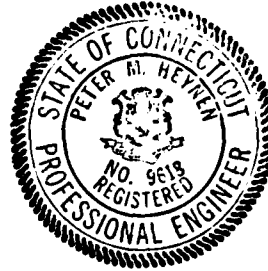
Based upon the visual inspection and past performance, the project is judged to be in poor condition. No evidence of instability in the embankments was observed. There are areas requiring attention such as trees and brush on the embankments, seepage through the central embankment, brush in the two auxiliary spillways, and erosion of the principle spillway.

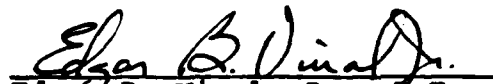
In accordance with Corps of Engineers Guidelines for size (Small) and hazard (High) classification for the dam, the test flood will be equivalent to the Probable Maximum Flood (PMF). Peak inflow to the pond is 7500 cubic feet per second (cfs); peak outflow is 6600 cfs with the dam overtopped 1.1 feet. The total spillway capacity with the water level to a low section of embankment (elevation 180.0) just to the left of the principal spillway is 770

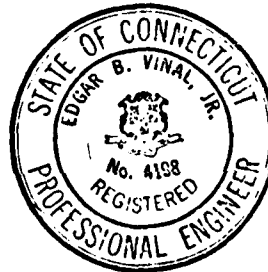
cfs, which is equivalent to 12% of routed test flood outflow. If recommendation one (1) in Section 7.2 is completed, the spillway capacity will be 3300 cfs, or 51% of the routed test flood outflow.

The above recommendations and further remedial measures which are discussed in Section 7, should be instituted within one (1) year of the owner's receipt of this report.


Peter M. Heynen, P.E.
Project Manager
Cahn Engineers, Inc.




Edgar B. Vinal, Jr., P.E.
Senior Vice President
Cahn Engineers, Inc.



This Phase I Inspection Report on Messerschmidt Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Aramast Mahtesian

ARAMAST MAHTESIAN, MEMBER
Geotechnical Engineering Branch
Engineering Division

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, CHAIRMAN
Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar
JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam would necessarily represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

TABLE OF CONTENTS

	<u>Page</u>
Letter of Transmittal	
Brief Assessment	i, ii
Review Board Signature Page	iii
Preface	iv
Table of Contents	v-vii
Overview Photo	viii
Location Map	ix

SECTION 1: PROJECT INFORMATION

1.1	<u>General</u>	1
	a. Authority	
	b. Purpose of Inspection Program	
	c. Scope of Inspection Program	
1.2	<u>Description of Project</u>	2
	a. Location	
	b. Description of Dam and Appurtenances	
	c. Size Classification	
	d. Hazard Classification	
	e. Ownership	
	f. Operator	
	g. Purpose of Dam	
	h. Design and Construction History	
	i. Normal Operational Procedures	
1.3	<u>Pertinent Data</u>	3
	a. Drainage Area	
	b. Discharge at Damsite	
	c. Elevations	
	d. Reservoir	
	e. Storage	
	f. Reservoir Surface	
	g. Dam	
	h. Diversion and Regulatory Tunnel	
	i. Spillway	
	j. Regulating Outlets	

SECTION 2: ENGINEERING DATA

2.1	<u>Design</u>	8
	a. Available Data	
	b. Design Features	
	c. Design Data	

2.2	<u>Construction</u>	8
	a. Available Data	
	b. Construction Considerations	
2.3	<u>Operations</u>	8
2.4	<u>Evaluation</u>	8
	a. Availability	
	b. Adequacy	
	c. Validity	

SECTION 3: VISUAL INSPECTION

3.1	<u>Findings</u>	10
	a. General	
	b. Dam	
	c. Appurtenant Structures	
	d. Reservoir Area	
	e. Downstream Channel	
3.2	<u>Evaluation</u>	12

SECTION 4: OPERATIONAL PROCEDURES

4.1	<u>Regulating Procedures</u>	14
4.2	<u>Maintenance of Dam</u>	14
4.3	<u>Maintenance of Operating Facilities</u> ..	14
4.4	<u>Description of Any Warning System</u> <u>in Effect</u>	14
4.5	<u>Evaluation</u>	14

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1	<u>Evaluation of Features</u>	15
	a. General	
	b. Design Data	
	c. Experience Data	
	d. Visual Observations	
	e. Test Flood Analysis	
	f. Dam Failure Analysis	

SECTION 6: STRUCTURAL STABILITY

6.1	<u>Evaluation of Structural Stability</u> ...	17
	a. Visual Observations	
	b. Design and Construction Data	
	c. Operating Records	
	d. Post Construction Changes	
	e. Seismic Stability	

SECTION 7: ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1	<u>Dam Assessment</u>	18
	a. Condition	
	b. Adequacy of Information	
	c. Urgency	
	d. Need for Additional Information	
7.2	<u>Recommendations</u>	18
7.3	<u>Remedial Measures</u>	19
	a. Operation and Maintenance Procedures	
7.4	<u>Alternatives</u>	20

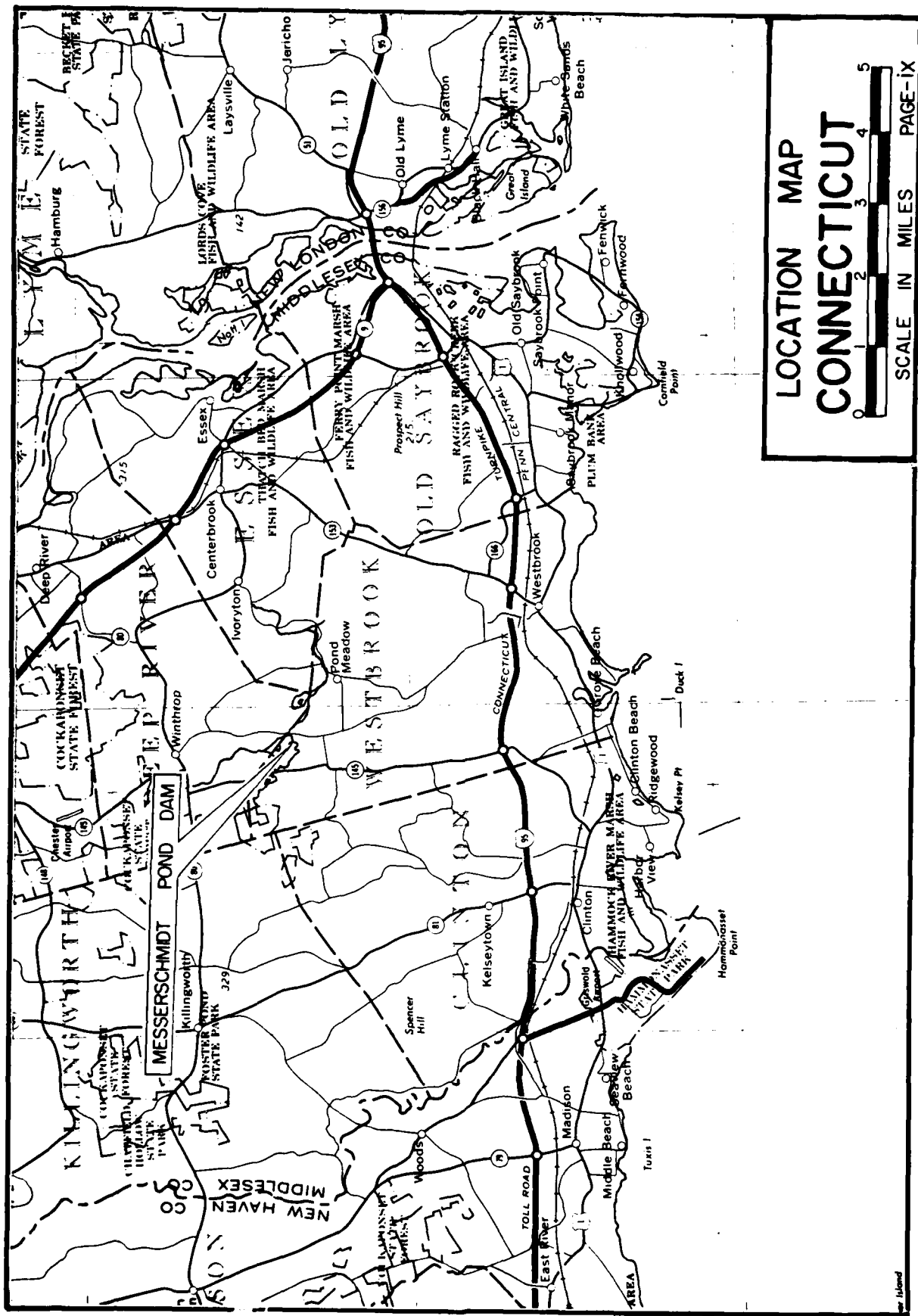
APPENDICES

	<u>Page</u>
Appendix A: Inspection Checklist	A-1 to A-9
Appendix B: Engineering Data and Correspondence	
Dam Plan, Profile and Sections	Sheet B-1
Location Plan of Dam and Dikes	Sheet B-2
Data and Correspondence	B-1 to B-35
Appendix C: Detail Photographs	
Photograph Location Plan	Sheet C-1
Photographs	C-1 to C-6
Appendix D: Hydraulic/Hydrologic Computations	
Drainage Area Map	Sheet D-1
Computations	D-1 to D-17
Preliminary Guidance	i-viii
Appendix E: Information as Contained in the National Inventory of Dams	E-1



OVERVIEW PHOTO

US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS		Messerschmidt Pond Dam Falls River	West Brook CONNECTICUT	DATE Nov 1979 CE #27 660KD PAGE VIII
CAHN ENGINEERS INC. WALLINGFORD, CONN ENGINEER					



PHASE I INSPECTION REPORT

MESSERSCHMIDT POND DAM

SECTION I - PROJECT INFORMATION

1.1 GENERAL

a. Authority - Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of August 28, 1979 from William E. Hodgson, Jr. Colonel, Corps of Engineers. Contract No. DACW 33-79-C-0059 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

1. Perform technical inspection and evaluation of non-federal dams to identify conditions requiring correction in a timely manner by non-federal interests.
2. Encourage and prepare the States to quickly initiate effective dam inspection programs for non-federal dam.
3. To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

1. Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.
2. A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.
3. Computations concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.
4. An assessment of the condition of the facility and corrective measures required.

It should be noted that this report does not pass judgement on the safety or stability of the dam other than on a visual basis. The inspection is to identify those features of the dam which need corrective action and/or further study.

1.2 DESCRIPTION OF PROJECT

a. Location - The dam is located on the Falls River in a rural area of the town of Westbrook, County of Middlesex, State of Connecticut. The dam is shown on the Essex USGS Quadrangle Map having coordinates latitude N 41° 20.3' and longitude W 72° 29.0'.

b. Description of Dam and Appurtenances - The project consists of three earthfill embankments, three spillways and a powerhouse and factory building. The central embankment is 180+ feet long, the left embankment is 200+ feet and the right embankment is 165+ feet in length. The embankments are approximately 15 feet wide at the crest, the central and right embankments are 26+ feet above the streambed of Falls River, and the left embankment is 24+ feet high. The factory building and a concrete retaining wall are located at the downstream slope of the left embankment, adjacent to the principal spillway. A corewall extends from the right training wall of the principal spillway into the central embankment (See Sheet B-1). The crest elevation of the three embankments is 182+ except for 55+ feet of the left embankment, which is a low area (elevation 180.0) just to the left of the principal spillway. The upstream slope inclinations are 2.5+ horizontal to 1+ vertical and the downstream slope inclinations are 2+ horizontal to 1+ vertical. Riprap is used as protection for the upstream slope on all embankments.

The principal Spillway is a 63+ foot long stone, mortar masonry weir located between the central and left embankments. Auxiliary Spillway #1 is 60+ feet in length and located at the right end of the right embankment. Auxiliary Spillway #2 is located approximately 500 feet southwest of the central embankment and is 71+ feet in length. The two auxiliary spillways are actually low swales with Auxiliary Spillway #2 having a 0.8 foot wide concrete sill as the crest. The principal spillway crest is at elevation 178, Auxiliary Spillway #1 is at elevation 179.5, and Auxiliary Spillway #2 is at elevation 179. There are posts for flashboard installation at the principal spillway, but no boards were in place.

The outlet facility is a 10 foot deep by 5 foot wide concrete sluice at the right end of the left embankment with stop-planks and 2 bar screens. Water from the sluice flows to a turbine which is located in the factory building at the downstream slope of the left embankment. Water exits from the building in a 5 foot high by 5.5 foot wide tailrace to the downstream spillway channel. A gate at the turbine allows water to bypass the turbine, flow through the turbine or to be shut off completely. The top elevation of the stop-planks is 179.5, but can be lowered by removing one or more of the planks.

c. Size Classification - (SMALL) - The dam impounds 910 acre-feet of water with the pond level to the top of the low section of the left embankment, which at elevation 180, is 24 feet above the old streambed. According to the Recommended Guidelines, a dam with this height and storage capacity is classified as small in size. (See note page D-1).

d. Hazard Classification - (HIGH) - If the dam was to be breached, there is potential for loss of life and extensive property damage 3000+ feet downstream at Wrights Pond Dam and at 3 or more residential structures located 1200+ feet downstream from Wrights Pond at Lynn Road and East Pond Meadow Road (See Sheet D-1). A breach of the dam would result in a flow of 13,100 cfs or a rise of 4 feet in the water level at the initial impact area, which corresponds to an increase in the water level from a depth of 1.6 feet just before the breach to a depth of 5.6 feet just after the breach. This rapid increase in the water level at the initial impact area would inundate the house at Wright's Pond Dam by some 4 feet and overtop the dam at Wright's Pond by more than 4.5 feet.

e. Ownership - Charles Messerschmidt, Jr.
Rural Route 1
Box 176
Westbrook, Conn. 06498
(203) 399-6174

f. Operator - none

g. Purpose - Hydroelectric - The facilities for generating power are presently not in use, as the factory for which these were built is closed down. There is no recreational use for the pond as it is privately owned and posted for no trespassing.

h. Design and Construction History - The following information is believed to be accurate based on the plans and correspondence available. The original dam was built in the late 1800's and owned by Mr. Kremsler. It was then purchased by Charles Messerschmidt, Sr. between 1912 and 1914. The dam was raised 2+ feet in 1939 with a sluice added to provide water for a turbine installed at a factory on the downstream slope. Also at this time, two auxiliary spillways were built and flashboards installed at all three spillways. The flashboards have been removed.

i. Normal Operational Procedures - The water level in the pond is maintained at the principal spillway crest or elevation 178. The stop-planks at the outlet sluice are normally kept at 1.5+ feet above the principal spillway crest elevation to cut off flow into the sluice, but planks can be removed if needed. The turbine gate is normally kept open in the bypass position.

1.3 PERTINENT DATA

a. Drainage Area - 4.1 square miles of relatively undeveloped, rolling wooded terrain.

b. Discharge at Damsite - Discharge at the dam is over the principal spillway, the two auxiliary spillways and through the sluice to the turbine.

1. Outlet Works (conduits):

36"+ diameter cast iron
penstock at turbine:

20 cfs with water level
to top of left embankment
(elevation 180.0)

2. Maximum known flood at damsite:

2+ feet over spillway
in 1938

3.	Ungated spillway capacity at:	
a.	Top of low portion of dam at left embankment el. 180+:	770 cfs
b.	Top of central embankment el. 182+:	3300 cfs
4.	Ungated spillway capacity at test flood el. 183.1:	5220 cfs
5.	Gated spillway capacity normal pool:	N/A
6.	Gated spillway capacity at test flood:	N/A
7.	Total spillway capacity at test flood el. 183.1:	5220 cfs
8.	Total project discharge at test flood el. 183.1:	6600 cfs
c.	<u>Elevations</u> (National Geodetic Vertical Datum based on assumed spillway elevation of 178.0)	
1.	Streambed at centerline of dam:	156
2.	Maximum tailwater:	N/A
3.	Upstream portal invert diversion tunnel:	N/A
4.	Recreation pool:	N/A
5.	Full flood control pool:	N/A
6.	Spillway crest (ungated):	
a.	Principal spillway	178.0
b.	Auxiliary spillway #1	179.5
c.	Auxiliary spillway #2	179.0
7.	Stop-planks:	179.5
8.	Design Surcharge (Original):	Unknown
9.	Top of dam;	
a.	Central embankment	182.0
b.	Low area at left embankment:	180.0
10.	Test flood surcharge:	183.1

d. Reservoir

- | | |
|----------------------------------|----------|
| 1. Length of maximum pool: | 4200 ft. |
| 2. Length of recreation pool: | N/A |
| 3. Length of flood control pool: | N/A |

e. Storage

- | | |
|-------------------------|--------------------------|
| 1. Recreation pool: | N/A |
| 2. Flood control pool: | N/A |
| 3. Spillway crest pool: | 700 acre-ft. |
| 4. Top of dam: | 910 acre-ft. (El. 180.0) |
| 5. Test flood pool: | 1000 acre-ft. |

f. Reservoir Surface

- | | |
|------------------------|-----------|
| 1. Recreation pool: | N/A |
| 2. Flood control pool: | N/A |
| 3. Spillway crest: | 85 acres |
| 4. Top of dam: | 100 acres |
| 5. Test flood pool: | 110 acres |

g. Dam

- | | |
|---------------------|---|
| 1. Type: | Earth embankment |
| 2. Length: | 545 ₊ |
| 3. Height: | 24 ft. (left embankment)
26 ft. (central embankment) |
| 4. Top width: | 15 ₊ ft. |
| 5. Side slopes | 2.5 H to 1 V (Upstream)
2 H to 1 V (Downstream) |
| 6. Zoning: | N/A |
| 7. Impervious Core: | Unknown |
| 8. Cutoff: | Unknown |

9. Grout Curtain: N/A
10. Other: Corewall at central embankment shown in proposed plan for raising dam

h. Diversion and Regulatory Tunnel - N/A

i. Spillway

Principal Spillway

1. Type: broad crested masonry weir
2. Length of weir: 63 \pm ft.
3. Crest elevation: 178
4. Gates: N/A
5. Upstream Channel: natural pond bottom
6. Downstream Channel: rocky streambed
7. General: Downstream face of weir is vertical and stepped.

Auxiliary Spillways

1. Type: Natural swales. auxiliary spillway #2 has 0.8 foot wide concrete sill.
2. Length of weir; auxiliary #1 - 60 \pm ft.
auxiliary #2 - 70 \pm ft.
3. Crest elevation: auxiliary #1 - 179.5
auxiliary #2 - 179
4. Gates: N/A
5. Upstream Channel: tall grass and brush
6. Downstream channel: natural swale with small trees and brush
7. General: N/A

j. Regulating outlets - The outlet is a 10 foot deep by 5 foot wide concrete sluice to a turbine penstock which leads to a 5 foot by 5.5 foot masonry tailrace.

- | | |
|-----------------------|--------------------|
| 1. Invert: | 156+ (tailrace) |
| 2. Size: | 36" (penstock) |
| 3. Description: | Cast iron |
| 4. Control mechanism: | hand operated gate |
| 5. Other: | N/A |

SECTION 2: ENGINEERING DATA

2.1 DESIGN

a. Available Data - The available data consists of a "proposed" drawing by J. J. Kelsey, 1939 and a report by Roald Haestad, Inc., June 1973 titled "Hydrologic study of Messerschmidt Pond Watershed and Report on Messerschmidt Dam". Also, there were several inspection reports dated between 1940 and 1978 as well as an "Inventory Data" sheet compiled by the Connecticut State Board for the Supervision of Dams.

b. Design Features - The drawings and correspondence indicate the design features stated previously herein.

c. Design Data - There were no engineering values, assumptions, test results or calculations available for the original design or subsequent raising of the dam except the plans as listed in Section 2.1a.

2.2 CONSTRUCTION

a. Available Data - There were no inspection reports or as-built drawings for the original construction of the dam or subsequent raising in 1939.

b. Construction Considerations - No information was available concerning problems or engineering considerations arising during any construction at the dam.

2.3 OPERATIONS

Lake level readings are not taken at any regular intervals. According to the owner, the dam spillway capacity has never been exceeded. No formal operation records are known to exist.

2.4 EVALUATION

a. Availability - Existing data was provided by the owner and the State of Connecticut Department of Environmental Protection. The owner made the project available for visual inspection.

b. Adequacy - The limited amount of detailed engineering data available was generally inadequate to perform an in-depth assessment of the dam, therefore, the assessment of this dam must be based primarily on visual inspection, performance history, hydraulic computations of spillway capacity and approximate hydrologic judgments.

c. Validity - A comparison of record data and visual observation reveals no observable significant discrepancies in the record data. However, evidence of a toe drain at the left embankment was found during the field inspection. A 6 inch tile drain pipe was observed in the vicinity of the discharge channel and extending in the direction of the left embankment. Water flow was observed in

this pipe during the inspection and the owner reported that there is usually flow through this pipe all year round. Some modifications have been made to satisfy the recommendations in the Haestad report of June 1973. The right training wall of the principal spillway was raised to the level of the central embankment, the cavity in the center of this spillway was temporarily repaired, and brush was removed from the auxiliary spillways.

SECTION 3: VISUAL INSPECTION

3.1 FINDINGS

a. General - The general condition of the project is poor. The inspection revealed areas requiring maintenance, monitoring and repair. The pond level was at elevation 178.0 with water flowing over the principal spillway (left side) during the inspection.

b. Dam

Crest - The 15+ foot wide crest is grass and brush covered (Photos 1 and 2). No misalignment or depression of the crest were observed. However, a 55+ foot long section of the left embankment (adjacent to the principal spillway) is at elevation 180 and lower than the rest of the embankment.

Upstream Slope - The upstream slope, inclined approximately at 2.5 horizontal to 1 vertical is grass covered and partially protected by riprap. Some riprap displacement, brush and trees were noted on the slope. (Photo 1).

Downstream Slope - The downstream slope inclination is 2 horizontal to 1 vertical. There is a concrete retaining wall at the downstream slope of the left embankment adjacent to the left side of the factory building. Also, a small storage shed is located at the left side of this retaining wall and extends into the downstream slope of the left embankment. There is evidence that a toe drain might be installed at the downstream toe of the left embankment. A 6 inch tile pipe runs from the direction of the downstream slope of the left embankment and along the back of the factory building to the tailrace outlet. (Photo 12). The owner reported that there is a constant flow through this pipe. This flow was approximately 3 to 4 gallons per minute at the time of our inspection. Several ponded areas with stagnant water and extensive swampy areas were located at the toe of the central and right embankments, just below the downstream slope (Sheet B-1, Photo 4).

The downstream slope of all the embankments is very overgrown, including large trees of 12 inches and more in diameter (Photos 3 and 4). Erosion, probably caused by trespassing, was noted at the center and left side of the downstream slope of the central embankment (Photo 3). The concrete retaining wall at the left embankment had numerous deteriorations including spalling, exposed aggregate, and wide cracks up to 1 inch in width (Photo 5).

Spillways - The spillways are a principal spillway and two auxiliary spillways, Number 1 and Number 2.

Principal Spillway - The principal spillway, located between the left and central embankments, is a broad-crested masonry structure.

The downstream face of the spillway weir is stepped and shows signs of severe deterioration. The lower step of the crest has been removed for a length of 40+ feet (Photo 6). There were wet areas and efflorescence at several of the mortar joints on the downstream face of the masonry weir. Two 1/2 inch metal pipes were noted on both sides of the spillway crest between the first and second steps. They are probably drain pipes, one of which (the left pipe) was flowing with a rate of less than 1 gallon per minute. There are posts installed on the crest for flashboards but no boards are in place.

There is a substantial erosion area at the center of the masonry apron, approximately 10 feet long, 6 feet wide and 2 feet deep (Photo 6). Much of the masonry in this area is undermined and in need of repair.

The left concrete and stone masonry training wall has some erosion in the area at the downstream face of the weir, where the old masonry training wall meets the newer concrete cap (Photo 6). The shape of this erosion looks as though it was caused by the abrasive action of water and solids flowing over the spillway accompanied by freeze-thaw cycles. Water flowing over the spillway is distributed irregularly along its crest and is concentrated in the area of this training wall. During our inspection water was flowing over the crest only in this area.

The right spillway training wall has several vertical and diagonal cracks with openings of 1/8-1/4 inch (Photo 7). Some loose stones and a cavity were observed along this wall near the toe of the weir.

Auxiliary Spillway #1 - This depression is covered by tall grass and brush. The masonry training wall is in fair condition with some spalled and weathered areas (Photo 9). No evidence of flashboard installation was found during the inspection.

Auxiliary Spillway #2 - The concrete sill on the spillway crest is in good condition. All surrounding territory is heavily covered by swamp grass and brush (Photo 10). There were no flashboards installed at the time of the inspection.

c. Appurtenant Structures - The concrete intake sluice through the embankment to the turbine chamber is in good condition. No visible damage to the concrete was observed. The stop-planks installed at the upstream end of the sluice are tied together with wire and appear to be held tightly in place. The two bar screens behind this gate are clean and free of rust (Photo 11).

There was no seepage or large cracks observed in the masonry of the tailrace and the walls appeared stable (Photo 12). Several boulders and tall grass were noted on the floor of the discharge channel.

d. Reservoir Area - The area surrounding the reservoir is wooded and largely undeveloped. The slopes near the dam are stable and do not have any visible evidence of erosion or sloughing.

e. Downstream Channel - The downstream channel runs in the natural bed of Falls River. The channel banks are undeveloped, steep-sided and wooded to Wrights Pond 3000+ feet downstream.

3.2 EVALUATION

Based upon the visual inspection, the project was assessed as being generally in poor condition. The following features which could influence the future condition and/or stability of the project were identified.

1. Damaged concrete of the left embankment retaining wall, if left without repair, could lead to further deterioration and decrease the stability of this wall.
2. Seepage on the downstream slope of the central embankment and swampy areas at the toe of the central and right embankments may lead to erosion and sloughing of the downstream slopes.
3. Erosion of the downstream slope of the central embankment can contribute to the reduction of the reliability of the slope.
4. The lower step of the downstream face of the principal spillway weir is quite irregular with large areas totally removed. Many of the mortar joints are wet and have lime deposits. The present configuration of these steps will not provide adequate energy dissipation during high flows over the weir.
5. An erosion cavity on the left training wall of the principal spillway could cause failure of this wall, which would direct spillway flows toward the factory building.
6. The crest of the principal spillway weir appears to be sloping down from right to left, causing an uneven distribution of flow over the spillway and probably contributing to the erosion of the left spillway training wall.
7. Cracks and holes in the masonry of the right training wall of the principal spillway could weaken the strength and stability of this wall.
8. Large erosions in the principal spillway apron create a condition for undermining of the apron and spillway weir and contribute to further spillway deterioration.

9. Brush and trees at the auxiliary spillways reduce their capacity.
10. The channel for Auxiliary Spillway #1 runs along the downstream slope of the right embankment and could contribute to erosion of the slope and toe during times of flow through this spillway.
11. Heavy grass, brush and trees on the crest, upstream and downstream slopes of the dam embankments and the principal spillway could increase seepage along root systems in the structures and could cause extensive damage to the embankments if trees topple during strong winds and/or hurricane conditions.
12. The stop-planks at the outlet sluice are tied securely together with wire which may make it difficult to remove the planks in an emergency situation.

SECTION 4: OPERATIONAL PROCEDURES

4.1 REGULATING PROCEDURES

No formal lake level readings are taken at the dam. The top of the stop-planks at the outlet sluice are normally kept at an elevation 1.5+ feet above the principal spillway elevation and the gate at the turbine is kept in an open bypass position.

4.2 MAINTENANCE OF DAM

There is no formal program of maintenance or inspection at the dam.

4.3 MAINTENANCE OF OPERATING FACILITIES

No formal program for maintenance of operating facilities is in effect.

4.4 DESCRIPTION OF ANY FORMAL WARNING SYSTEM IN EFFECT

No formal warning system is in effect. The owner reports that he is at the dam during large storms and calls the fire or police department if he detects a problem.

4.5 EVALUATION

The operation and maintenance procedures are generally poor. A formal program of operations and maintenance procedures should be implemented, including documentation to provide complete records for future reference. Also, a formal warning system should be developed and implemented within the time frame indicated in Section 7.1c. Remedial operation and maintenance recommendations are presented in Section 7.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. General - The watershed for the Messerschmidt Pond Dam is 4.1 square miles of relatively undeveloped, rolling wooded terrain. The dam is located on the Falls River and is a low surcharge storage-high spillage facility. It was constructed to provide power to the factory (now abandoned) located just left of the principal spillway (elevation 178+). The central embankment, which has a top elevation of 182+, extends to the right of the principal spillway. To the immediate left of the principal spillway, there is a low area of dam approximately 55 feet long with several retaining walls and a top elevation of 180+ (Sheet B-1). Another 145 feet of embankment extends further to the left and rises gently from elevation 182+ to 186+. The impoundment capacity of the dam is 910 acre-feet with the water level to the low area left of the principal spillway.

To the right of the dam are the two auxiliary spillways which are actually natural depressions. One is 60 feet long at an elevation of 179.5+; the second is 500+ feet away, separated by a natural hill and is 71 feet long at a crest elevation of 179+. Both are heavily covered with brush.

b. Design Data - No original design computations were available although the dam was substantially reconstructed to its present form in the 1940's. A "Hydrologic Study of Messerschmidt Pond Watershed and Report on Messerschmidt Dam" was completed for the Connecticut Water Resources Commission in June of 1973 and is included in Appendix B. The 1973 report, its rating curves, etc. were not used in preparing the computations in Appendix D. For instance, the spillway rating in Appendix D which includes the two auxiliary spillways, permits passage of about 3000 cfs at top of dam (el. 182). The 1973 report permits passage of about 5000 cfs at this elevation. The probable major difference is in the spillway coefficients chosen, especially in the heavily overgrown auxiliary spillway areas where a very low value was chosen for use in Appendix D. Obviously, if the auxiliary spillways were cut clean and maintained, their conveyance would increase to a higher value. In any event, it was not felt appropriate to utilize the 1973 report as a basis for the computations in Appendix D.

c. Experience Data - No information on serious problem situations arising at the dam were found and it is reported that the dam has not been overtopped. It was also reported that the 1938 hurricane discharge was "about 2 ft. over the spillway crest (one foot over the flashboard height)". Note: The flashboards no longer exist.

d. Visual Observation - The two auxiliary spillways were extensively overgrown with tall grass and brush. There is a low area at the right end of the left embankment which is 2+ feet lower than the rest of the embankment. There is a low bridge over the downstream channel just below the factory building.

e. Test Flood Analysis - Based upon "Preliminary Guidance for Estimating Maximum Probable Discharge", dated March 1978, the watershed classification (rolling) and hydraulic/hydrologic computations, the test flood for this high hazard, small size dam is considered to be equivalent to the Probable Maximum flood (PMF) of 7500 cubic feet per second (cfs) (Appendix D-3). The peak outflow is 6600 cfs with the dam overtopped 1.1 feet (Appendix D-9). Based upon our hydraulic computations, the spillway capacity to the low section (el. 180+) of the dam is 770 cfs, which is approximately 12% of the routed Test Flood outflow. The spillway capacity to the top of the dam (el. 182+) is 3300 cfs or 51% of the routed test flood outflow.

The peak inflow for the one-half PMF is 3750 cfs, and the peak outflow is 3060 cfs with the surcharge to elevation 181.8, or 1.8 feet above the low section of dam just to the left of the principal spillway.

f. Dam Failure Analysis - This dam is classified as a high hazard - small size dam. The dam height (24 ft.) was measured to the low area (el. 180) at the left of the principal spillway. If the dam height is measured to the top of the central embankment, the dam would be 26 feet high, thus changing the classification from small to intermediate.

It is classified as a high hazard dam as a result of the initial impact a breach would have on a house 75'+ downstream of Wright's Pond dam (a mile downstream of Messerschmidt Pond Dam) and because the earth fill Wright's Pond Dam would be overtopped by 4.8 feet during a breach of Messerschmidt Pond Dam. A breach of Wright's Pond Dam would be probable under such circumstances and could impact the Pond Hill and Pond Meadow Road area a quarter of a mile downstream of Wrights Pond Dam. A breach computation for Wrights Pond Dam has not been made.

Utilizing the April, 1978, "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs", the peak failure outflow from the dam breaching would be 26,500 cubic feet per second. A breach of Messerschmidt Pond Dam would result in a flow of 13,100 cfs or a rise of 4 feet in the water level at the initial impact area, which corresponds to an increase in the water level from a depth of 1.6 feet just before the breach to a depth of 5.6 feet just after the breach. The breach of Messerschmidt Pond Dam would also result in an overtopping of Wrights Pond Dam. This overtopping at the initial impact area would endanger the existing house 75'+ below the Wrights Pond Dam spillway as well as increase the possibility for a breach of Wright's Pond Dam and extensive flooding at the Pond Hill and Pond Meadow Road area.

SECTION 6: STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observation - The visual inspection did not reveal any indication of stability problems. There are some areas of seepage and concrete and masonry deteriorations, as described in Section 3, however they are not considered stability concerns at the present time.

b. Design and Construction Data - There is not enough design and construction data available to permit an in-depth assessment of the structural stability of the project.

c. Operation Records - The operating records available do not include any indication of instability in the dam embankments since construction in 1890.

d. Post Construction Changes - The post-construction changes include raising of the dam 2 feet in 1939 and a removal of the 2 foot high flashboards on the principal and auxiliary spillways in the early 1970's.

e. Seismic Stability - The project is in Seismic Zone 1 and according to the Recommended Guidelines need not be evaluated for seismic stability.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 PROJECT ASSESSMENT

a. Condition - Based upon the visual inspection of the site and its past performance, the project appears to be in poor condition. No evidence of structural instability was observed in the dam embankments, principal spillway or appurtenant structures. The central embankment is generally in poor condition with erosion, seepage and extensive wet areas on the downstream slope and toe.

Based upon "Preliminary Guidance for Estimating Maximum Probable Discharge" dated March, 1978, the watershed classification and hydraulic/hydrologic computations, the peak inflow to the pond is 7,500 cfs; peak outflow (test flood) is 6,600 cfs with the dam embankments overtopped. The total spillway capacity to the top of the low section of the left embankment (elevation 180.0) is 770 cfs, which is equivalent to approximately 12% of the routed test flood outflow. The total capacity of the spillways to the top of the central embankment (elevation 182.0) is 3300 cfs, which is equivalent to 51% of the routed test flood outflow.

b. Adequacy of Information - The information available is such that an assessment of the condition and stability of the project must be based solely on visual inspection, past performance, and sound engineering judgement.

c. Urgency - It is recommended that the measures presented in Section 7.2 and 7.3 be implemented within one year of the owner's receipt of this report.

d. Need for Additional Information - There is a need for more information as recommended in Section 7.2

7.2 RECOMMENDATIONS

It is recommended that further studies be made by a registered professional engineer qualified in dam design and inspection pertaining to the following:

1. The structural stability of the retaining wall on the downstream slope of the low section of the left embankment when this area is considered as a spillway section. If there is a question as to the stability of this wall and this area cannot be considered as spillway, then the left spillway training wall at the principal spillway should be raised two (2) feet or to the same elevation as the central embankment. A suitable material should be placed, to raise the crest elevation of the low section up to the same elevation.
2. Further investigation and inspection of the project to check observable seepage and the condition of the spillways. The engineer should also make any necessary recommendations. Items of particular importance are as follows:

- (a) Influence of overflowing of auxiliary spillway #1 on creating the wet area at the toe of the right embankment.
 - (b) Necessity of installation of a drainage system at the toe of the central and right embankments for drying up these areas. Also, piezometer installation in the dam embankment for determination of the phreatic surface and monitoring.
 - (c) The erosion condition created at the left training wall of the principal spillway by the sloping or irregularity of the weir crest.
 - (d) The possibility of an unstable condition in the left embankment created by excavation of this embankment when installing the storage shed in this area.
 - (e) Removing the large trees (4 inches in diameter and more) and their root systems from the crest, slopes and toe of the dam embankments.
3. The possibilities for raising the low area at the right end of the left embankment to the same elevation as the other embankments.

7.3 REMEDIAL MEASURES

a. Operation and Maintenance Procedures - The following measures should be undertaken within the time frame indicated in Section 7.1.c, and continued on a regular basis.

- 1. Round-the-clock surveillance should be provided by the owner during periods of unusually heavy precipitation and high project discharge. The owner should develop a downstream warning system in case of emergencies at the dam.
- 2. A formal program of operation and maintenance procedures should be instituted and fully documented to provide accurate records for future reference.
- 3. A comprehensive program of inspection by a registered, professional engineer qualified in dam inspection should be instituted on an annual basis.
- 4. Exposed areas on the upstream slope of the dam embankments should be riprapped.
- 5. Substantially deteriorated concrete of the retaining wall on the downstream slope of the left embankment should be repaired.
- 6. Erosion area on the downstream slope of the central embankment should be filled and slope protection placed.

7. Seepage discharges in the 6 inch tile drain pipe at the toe of the left embankment should be monitored periodically. Also the wet areas on the downstream slope and toe of the right and central embankments should be observed and monitored.
8. Damaged masonry on the downstream face of the principal spillway should be restored. Mortar joints with moisture and efflorescence at the crest should be sealed, including the joint or joints around the 1/2 inch metal pipes in the weir.
9. Erosion of the masonry at the principal spillway apron should be cleaned of loose boulders and filled with a suitable material.
10. Concrete and masonry erosion of the principal spillway left training wall should be repaired at a time when the spillway is dry.
11. The right training wall of the principal spillway should be repaired to prevent further deterioration of the wall.
12. The training wall at Auxiliary Spillway #1 and the tailrace outlet should be repaired as necessary.
13. Grass, brush and small trees on the crest, slopes and toe of the dam embankments, principal and auxiliary spillways should be removed. The cutting of grass on these areas of the embankments and spillways should be continued as part of the routine maintenance.
14. All obstructions on the floor of the spillways and outlet channels should be removed.
15. Another method to prevent vandalism to the outlet sluice stop-planks, such as a bar and lock, should be installed. Tying the planks together with wire makes removal cumbersome.

7.4 ALTERNATIVES

One possible alternative to the above recommendations is draining the pond and removing the dam.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Messerschmidt Pond Dam

DATE: September 18, 1979

TIME: 9:15 am - 1:15 pm

WEATHER: Sunny, 75°F

W.S. ELEV. 178.0 U.S. _____ DN.S

PARTY:

INITIALS:

DISCIPLINE:

1. <u>Peter M. Heynen</u>	<u>PMH</u>	<u>Geotechnical</u>
2. <u>Miron Petrowsky</u>	<u>MP</u>	<u>Geotechnical</u>
3. <u>Jay Costello</u>	<u>JC</u>	<u>Geotechnical</u>
4. <u>Hector Moreno</u>	<u>HM</u>	<u>Hydraulic</u>
5. <u>Mashe Norman</u>	<u>MN</u>	<u>Survey</u>
6. <u>Charles Messerschmidt</u>	<u>CM</u>	<u>Owner</u>

PROJECT FEATURE

INSPECTED BY

REMARKS

1. <u>Main Embankment</u>	<u>PMH, MP, JC, MN</u>	
2. <u>Left Embankment</u>	<u>PMH, MP, JC, MN</u>	
3. <u>Principal Spillway</u>	<u>HM, MN, MP</u>	
4. <u>Auxiliary Spillway #1</u>	<u>HM, MN, MP</u>	
5. <u>Auxiliary Spillway #2</u>	<u>HM, MP</u>	
6. <u>Intake Sluice</u>	<u>HM, MN, MP</u>	
7. <u>Powerhouse</u>	<u>PMH, MP, JC,</u>	
8. <u>Sluice Outlet</u>	<u>PMH, MP, JC, HM</u>	
9. _____		
10. _____		
11. _____		
12. _____		

PERIODIC INSPECTION CHECK LIST

Page A-2

PROJECT Messerschmidt Pond Dam

DATE Sept. 18, 1979

PROJECT FEATURE Main Embankment

BY PMH, NP, JC, MN

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	<i>Right dam embankment from principal spillway</i>
Crest Elevation	<i>182.4</i>
Current Pool Elevation	<i>178.0</i>
Maximum Impoundment to Date	<i>Unknown</i>
Surface Cracks	<i>None observed</i>
Pavement Condition	<i>Good minor erosion</i>
Movement or Settlement of Crest	<i>None observed</i>
Lateral Movement	
Vertical Alignment	<i>Appears good</i>
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	<i>Some erosion near principal spillway</i>
Indications of Movement of Structural Items on Slopes	<i>None observed</i>
Trespassing on Slopes	<i>Some</i>
Sloughing or Erosion of Slopes or Abutments	<i>Erosion on d/s slope</i>
Rock Slope Protection-Riprap Failures	<i>Some riprap displacement</i>
Unusual Movement or Cracking at or Near Toes	<i>None observed</i>
Unusual Embankment or Downstream Seepage	<i>Seepage and wet areas at d/s slope and toe</i>
Piping or Boils	<i>None observed</i>
Foundation Drainage Features	<i>Unknown</i>
Toe Drains	<i>Unknown 2.5" metal pipe outlet with seepage</i>
Instrumentation System	<i>N/A</i>

PERIODIC INSPECTION CHECK LIST

Page A-3PROJECT Messerschmidt Pond DamDATE Sept. 18, 1979PROJECT FEATURE Left EmbankmentBY PMH, M.P., JC, MN

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u>	<i>Left dam embankment from principal spillway</i>
Crest Elevation	<i>180.0</i>
Current Pool Elevation	<i>178.0</i>
Maximum Impoundment to Date	<i>Unknown</i>
Surface Cracks	<i>None observed</i>
Pavement Condition	<i>Good</i>
Movement or Settlement of Crest	<i>None observed</i>
Lateral Movement	
Vertical Alignment	<i>Appears good</i>
Horizontal Alignment	
Condition at Abutment and at Concrete Structures	<i>Damaged concrete on retaining wall of d/s slope</i>
Indications of Movement of Structural Items on Slopes	<i>None observed</i>
Sloughing or Erosion of Slopes or Abutments	
Rock Slope Protection-Riprap Failures	<i>Heavy brush on u/s slope</i>
Unusual Movement or Cracking at or Near Toes	<i>None observed</i>
Unusual Embankment or Downstream Seepage	
Piping or Boils	<i>Unknown</i>
Foundation Drainage Features	
Toe Drains	<i>6" tile drain pipe</i>
Instrumentation System	<i>N/A</i>
Trespassing on Slopes	<i>Some</i>

PERIODIC INSPECTION CHECK LIST

Page A-4PROJECT Messerschmidt Pond DamDATE Sept. 18, 1979PROJECT FEATURE Principal SpillwayBY MW, MP, HM

AREA EVALUATED		CONDITION
<u>OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>		<i>Masonry structure</i>
a) <u>Approach Channel</u>		
General Condition		<i>Under water</i>
Loose Rock Overhanging Channel		
Trees Overhanging Channel		
Floor of Approach Channel		
b) <u>Weir and Training Walls</u>		
General Condition of Concrete		<i>Masonry - poor</i>
Rust or Staining		<i>N/A</i>
Spalling		<i>Deteriorated crest and left train wall</i>
Any Visible Reinforcing		<i>N/A</i>
Any Seepage or Efflorescence		<i>Seepage and wet joints on crest</i>
Drain Holes		<i>Unknown</i>
c) <u>Discharge Channel</u>		
General Condition		<i>Fair</i>
Loose Rock Overhanging Channel		<i>None observed</i>
Trees Overhanging Channel		<i>Some</i>
Floor of Channel		<i>Natural streambed</i>
Other Obstructions		<i>Boulders in spillway channel</i>

PERIODIC INSPECTION CHECK LIST

Page A-5

PROJECT Messerschmidt Pond Dam

DATE Sept. 18, 1979

PROJECT FEATURE Auxiliary Spillway #1

BY MPMN, HM

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	<i>Natural swale near right embankment</i>
a) <u>Approach Channel</u>	
General Condition	<i>Natural ground</i>
Loose Rock Overhanging Channel	<i>None observed</i>
Trees Overhanging Channel	<i>Some</i>
Floor of Approach Channel	<i>Overgrown by brush</i>
b) <u>Weir and Training Walls</u>	<i>Only left masonry training wall</i>
General Condition of Concrete	<i>Fair</i>
Rust or Staining	<i>N/A</i>
Spalling	<i>Some</i>
Any Visible Reinforcing	<i>N/A</i>
Any Seepage or Efflorescence	<i>None observed</i>
Drain Holes	<i>N/A</i>
c) <u>Discharge Channel</u>	
General Condition	<i>Poor</i>
Loose Rock Overhanging Channel	<i>None observed</i>
Trees Overhanging Channel	<i>Some trees</i>
Floor of Channel	<i>Natural ground</i>
Other Obstructions	<i>Heavy brush, trees and grass in spillway channel</i>

PERIODIC INSPECTION CHECK LIST

Page A-6

PROJECT Messerschmidt Pond Dam

DATE Sept. 18, 1979

PROJECT FEATURE Auxiliary Spillway #2

BY HM, MP

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	<i>Natural swale at 500' S.W. of right embankment</i>
a) <u>Approach Channel</u>	
General Condition	<i>Natural ground</i>
Loose Rock Overhanging Channel	<i>None observed</i>
Trees Overhanging Channel	<i>Some</i>
Floor of Approach Channel	<i>Overgrown by brush</i>
b) <u>Weir and Training Walls</u>	<i>Concrete sill</i>
General Condition of Concrete	<i>Good</i>
Rust or Staining	<i>None observed</i>
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	
Drain Holes	<i>N/A</i>
c) <u>Discharge Channel</u>	
General Condition	<i>Poor</i>
Loose Rock Overhanging Channel	<i>None observed</i>
Trees Overhanging Channel	<i>Some</i>
Floor of Channel	<i>Natural ground</i>
Other Obstructions	<i>Heavy grass, brush and trees in spillway channel</i>

Page A-7

DATE Sept. 18, 1979

BY MP, MN, HM

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-INTAKE CHANNEL AND INTAKE STRUCTURE</u>	
a) <u>Approach Channel</u> Slope Conditions Bottom Conditions Rock Slides or Falls Log Boom Debris Condition of Concrete Lining Drains or Weep Holes	<i>N/A</i>
b) <u>Intake Structure</u> Condition of Concrete Stop Logs and Slots	<i>Good</i> <i>Timber gate and two bar screens are in good condition</i>

PERIODIC INSPECTION CHECK LIST

Page A-8PROJECT Messerschmidt Pond DamDATE Sept. 18, 1979PROJECT FEATURE PowerhouseBY PMH, MP, JC

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-CONTROL TOWER</u>	
a) <u>Concrete and Structural</u>	
General Condition	Good
Condition of Joints	Unknown
Spalling	None observed
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	Unknown
Unusual Seepage or Leaks in Gate Chamber	None observed
Cracks	
Rusting or Corrosion of Steel	
b) <u>Mechanical and Electrical</u>	
Air Vents	N/A
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	Turbine gate valve, operable
Service Gates	
Emergency Gates	
Lightning Protection System	N/A
Emergency Power System	
Wiring and Lighting System	

A-8

PERIODIC INSPECTION CHECK LIST

Page A-9

PROJECT Messerschmidt Pond Dam

DATE Sept. 18, 1979

PROJECT FEATURE Sluice Outlet

BY PMH, MP, JC, HM

AREA EVALUATED	CONDITION
<u>OUTLET WORKS-OUTLET STRUCTURE AND OUTLET CHANNEL</u>	<u>Masonry outlet structure</u>
General Condition of Concrete	<u>Fair</u>
Rust or Staining	<u>N/A</u>
Spalling	<u>Some</u>
Erosion or Cavitation	<u>None observed</u>
Visible Reinforcing	<u>N/A</u>
Any Seepage or Efflorescence	<u>None observed</u>
Condition at Joints	} <u>N/A</u>
Drain Holes	
Channel	
Loose Rock or Trees Overhanging Channel	<u>None observed</u>
Condition of Discharge Channel	<u>Boulders and some brush in channel</u>

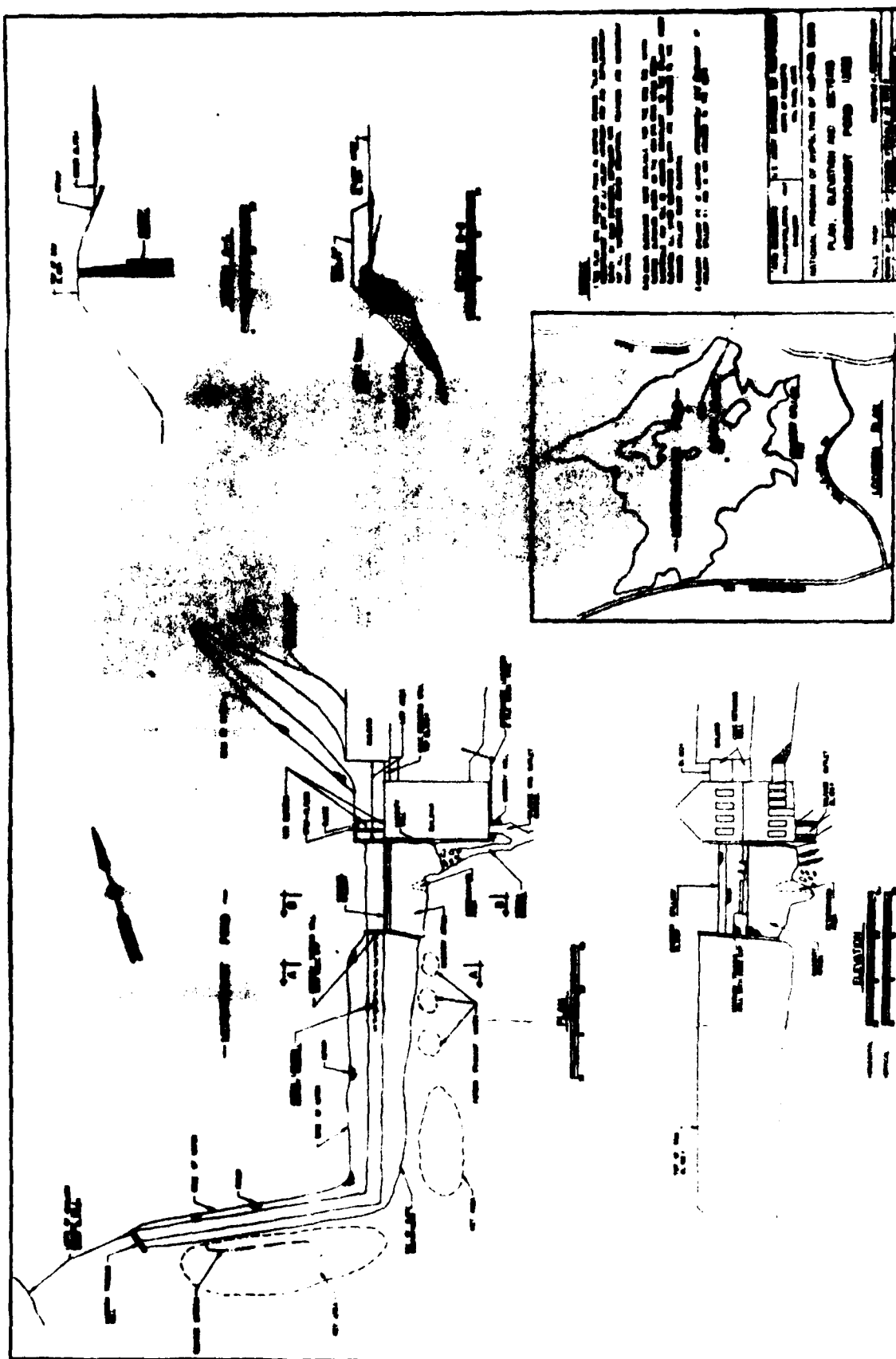
APPENDIX B

ENGINEERING DATA AND CORRESPONDENCE

MESSERSCHMIDT POND DAM

EXISTING PLANS

"Plan Showing Messerschmidt Dam"
November, 1938
J. J. Kelsey, C.E.
1 sheet



SUMMARY OF DATA AND CORRESPONDENCE

<u>DATE</u>	<u>TO</u>	<u>FROM</u>	<u>SUBJECT</u>	<u>PAGE</u>
Dec. 21, 1940	General S. H. Wadhams, Chairman State Board of Supervision of Dams	C. M. Blair, Member State Board of Supervision of Dams	Construction at Messerschmidt	B-3
March 14, 1963	William S. Wise, Director Water Re- sources Commission	John J. Mozzochi and Assoc., Civil Engineers	Inspection of Dam	B-5
May 28, 1963	File	State Board for the Super- vision of Dams	Inventory Data	B-7
June 24, 1969	Charles Messerschmidt	W. H. O'Brian, C.E.	Inspection report	B-8
Feb. 13, 1970	File	W.H. O'Brian, C.E.	Inspection report	B-9
June 1973	File	State of Conn. Dept of Environmental Protection	Hydrologic study of Messerschmidt Pond Watershed and report on Dam	B-11
Dec. 3, 1973	Victor F. Galgowski Supt. of Dam Mainte- nance	Charles Messerschmidt	Progress report on maintenance work at dam	B-34
Dec. 8, 1978	Victor F. Galgowski Supt. of Dam Mainte- nance	Charles J. Pelletier Consultant, D.E.P.	Inspection report	B-35

STATE OF CONNECTICUT

SANFORD H. WADHAM, CHAIRMAN
HARTFORD
SHEPARD B. PALMER, SECRETARY
NORWICH



CLARENCE M. BLAIR, NEW HAVEN
WILLIAM H. CADWELL, NEW BRITAIN
JOSEPH W. CONE, GREENWICH
WILLIAM A. MACKENZIE, WALLINGFORD

STATE BOARD OF SUPERVISION OF DAMS

ROOM 317, STATE OFFICE BUILDING, HARTFORD

Created by Chapter 290 of the Public Acts of 1939 to supervise dams, dikes, reservoirs and other similar structures. "All such structures, with their appurtenances, without exception and without further definition or enumeration herein, which, by breaking away or otherwise, might endanger life or property, shall be subject to the jurisdiction conferred by this act."

STATE BOARD OF SUPERVISION

PLEASE REPLY TO

P. O. Box 236, New Haven
December 21st, 1940

General S. H. Wadhams, Chairman
State Board of Supervision of Dams
317 State Office Building
Hartford, Conn.

Dear General Wadhams:

The work at the Messerschmidt Dam on Falls River in the Town of Westbrook on which Preliminary Certificate No. 3-19 (old book) was issued, has been completed, and I am forwarding to you for filing under separate cover the final plan of the dam. Enclosed is your copy of the Certificate of Approval No. 3-3, from the new book. Mr. Lesserschmidt has been sent the original Certificate of Approval with instructions to have it recorded in the Westbrook Land Records.

Very truly yours,

A handwritten signature in cursive script, appearing to read "C. M. Blair".

C.B:GRB

Member, State Board of Supervision of Dams

BOARD OF SUPERVISION OF DAMS

3- 3

CERTIFICATE OF APPROVAL

To Owner Charles Messerschmidt
 P. O. Address Deep River, Conn
 Name of Structure Falls River Dam

New Haven, Conn.
Dec. 21, 1940

This is to certify that the following construction work: Raising Dam to Elev. 105
(Spillway elev 102) - Raise of 2 feet, performed on property owned by you on
Falls River, in the Town of Westbrook
 for which preliminary permit was issued Mar. 21, 1940 has been completed to the satisfaction
 of this Board and that such structure is approved and has been found to be safe as of date of this certificate.

BOARD OF SUPERVISION OF DAMS
 BY

Clarence M. Blair, Member

Note: The owner is required by law to record this certificate in the Land Records of the town or towns in which the dam or reservoir is located.

Remarks: (Record dates of inspections, etc.)

Inspection - Nov. 22, 1939; Aug. 31, 1940;
Sep. 5, 1940; Sep. 21, 1940; Nov. 9, 1940
Watershed 3.3 sq. m
Top of Dam El. 105
Spillways 58' El. 102
80' 103
46' 104
Capacity 2' deep 246 cfs/sq. m El. 104
2 1/2' 380 El. 104.5

RECEIVED
 DEC 23 1940
 STATE WATER COMMISSION

JOHN J. MOZZOCHI AND ASSOCIATES
CIVIL ENGINEERS

Westbrook

GLASTONBURY, CONN.
217 HEDRON AVENUE
PHONE MEDFORD 3-3401

PROVIDENCE S. R. 1.
200 DYER STREET
PHONE GASPER 1-0420

JOHN J. MOZZOCHI

ASSOCIATES

OWEN J. WHITE
JOHN LUCHS, JR.
ECTOR L. GIOVANNINI

STATE WATER RESOURCES
COMMISSION
RECEIVED

MAR 15 1963

March 14, 1963

REPLY TO: Glastonbury

William S. Wise-Director
Water Resources Commission
State Office Building
Hartford 15, Connecticut

ANSW R.D.

R.F.R.R.D.

Sign

Re: Our File 57-73-30

Wrights Pond Dam

Westbrook, Connecticut

Dear Mr. Wise:

As per your request, I inspected the subject dam on March 13th to verify the conditions reported to me by Mr. John Luchs, my partner, who had made an inspection in my absence on March 8th.

I found that the condition of the dam had not changed since my inspection of June 19, 1962 and as reported to your Mr. Hupfer by my letter of June 20, 1962. I repeat the statements I made then that the dam is substantially sound and in no immediate danger. However, maintenance work of pointing up the joints, re-grading the earthen top where needed, re-setting the upstream stone coping and removing all brush from the dam should be done by the owner.

While I was in the vicinity, I made an inspection of three other dams, namely; Bushy Hill Pond, Comstock Pond and Messerschmidt Pond. The first two of these dams are owned by Pratt Read & Company, of Ivoryton and were found to be in good condition.


The Messerschmidt Pond dam is owned by the Deep River Manufacturing Company (actually Messerschmidt family) and was also found to be in good condition. Last summer, Mr. Messerschmidt made some revisions which could be classified as constructive maintenance in that:

1. The old 12" flashboards, which were the single plank type semi-permanently fastened to iron pipe supports, were replaced by easily removed 2"x4"x5'-0" planks end-supported by 2" I-beams and

2. The earthen dikes were widened at the top from the original 12' to about 20'.

This dam is the largest in the watershed and has a pond area of about 100 acres. According to the owner, it was rebuilt to its present form during the 1940's by approved plans and a permit from the Dam Commission, a record of which must be in your office. The dam has the safety feature of two emergency spillways, each wider than the main spillway, which begin to flow when the pond elevation reaches the height of the top of the flashboards. The highest record discharge, according to the owner, occurred in 1938 at about 2' over the spillway (one foot over the flashboard height.)

Very truly yours,


John J. Mozzochi and Associates
Civil Engineers

JJM:hk

28 MAY 1963

WPS

STATE BOARD FOR THE SUPERVISION OF DAMS
INVENTORY DATA

CT-392

Name of Dam or Pond MESSERSCHMIDT POND

Code No. 71 1A

Location of Structure

Town WESTBROOK

Name of Stream FALLS RIVER

U.S.G.S. Quad. ESSEX

Owner DEEP RIVER MANUFACTURING COMPANY

Address DEEP RIVER

Pond Used For WATER POWER

Dimensions of Pond: Width 1700 FEET Length 3000 FEET Area 82.6 ACRES

Total Length of Dam 225 FEET Length of Spillway 58 FEET

Depth of Water Below Spillway Level (Downstream) 20 FEET

Height of Abutments Above Spillway 3 FEET

Type of Spillway Construction ROCK, STOP LOGS (2' x 4')

Type of Like Construction EARTH

Downstream Conditions CULVERT UNDER HORSE HILL ROAD AND WOODS

Summary of File Data CERTIFICATE OF APPROVAL FOR RAISING DAM WAS ISSUED 12-21-40 BY C.M. BLAIR. DAM WAS INSPECTED 3-13-63 BY J.J. MOZZUCHI AND FOUND TO BE IN GOOD CONDITION.

1890? Remarks FAILURE OF THIS DAM COULD CAUSE DAMAGE DOWNSTREAM. 126 FEET OF ADDITIONAL EMERGENCY SPILLWAY IS ON THE SOUTH SIDE OF THE POND AT HIGHER ELEVATIONS

June 24, 1969

Mr. Charles Messerschmidt
RR #1
Deep River, Connecticut

Subject: Messerschmidt Pond Dam
Westbrook, Connecticut

Dear Mr. Messerschmidt:

According to the records of this office, you are the owner of the subject dam.

Under the provisions of the General Statutes, copy enclosed, the Water Resources Commission has jurisdiction over this dam which is one "- - which by failure or otherwise might endanger life or property - -".

This dam was inspected by the undersigned on June 12, 1969. Generally speaking, trees should not be allowed to grow on dams because their root systems can cause damage and they can rip a hole in the dam if they blow over.

There was a large flow of water in a channel on the downstream face of the overflow section the brigin of which could not be determined.

We understand from a man on the site that this flow dries up when water stops flowing over the spillway. Would you please advise us when water is no longer flowing over the spillway and we will have our consultant engineer inspect the dam to see if the dam is safe. The trees would not have to be cut until we determine if they are a threat to the safety of the dam.

In the meantime, if you could locate any plans or description of the original dam and any subsequent raisings this would be helpful. We do have a plan dated November, 1939 prepared by J. J. Kelsey, engineer, which calls for raising the dam two feet, but we do not have any original or other plans.

Very truly yours,

William H. O'Brien III
Civil Engineer

WHO:vhb

B-8

INTERDEPARTMENT MAIL

DATE

Feb. 13, 1970

TO File	DEPARTMENT
FROM William H. O'Brien, Civil Engineer	DEPARTMENT Water Resources Commission
SUBJECT Messerschmidt Pond Dam, Westbrook	

On February 6, 1970 the undersigned and Charles Pelletier, Division Engineer inspected the subject dam in the company of Mr. Messerschmidt.

The following points were noted:

1. The training walls on the spillway abutments should be raised to same elevation as the top of the dam, and earth brought in to level off the top. Water was flowing over the approximate 9 inch high flashboards.
2. The tops of the trees on the downstream side of the dam had been cut off approximately to the level of the top of the dam to eliminate danger from being wind-thrown. However the roots will continue to grow and therefore the entire tree should be cut down. (Verify species of trees and conclusions of "roots in dams" investigation before requesting removal)
3. There are two overflow spillways each has a greater width than the principal spillway. Both are on the southwest side of the pond, west of the principal spillway.
 - (a) The eastern most emergency spillway was in original ground at the west abutment of the dam. It appeared that flows thru this spillway would be directed along the downstream toe of the dam. The owner said this had never been a problem.
 - (b) The western most emergency spillway had a concrete sill at the same elevation as the top of the flashboards on the principal spillway which are approximately 9 inches above the permanent concrete of the principal spillway. (i.e. this emergency spillway has a crest approximately 9 inches above the principal spillway.) There are also flashboards on this concrete sill which are not effective since about 20 percent of them are missing. It would be best to remove the rest of them to utilize the full effectiveness of this spillway.

4. We told Mr. Messerschmidt we would plan to inspect the dam again in the summer when "low flow" conditions were prevailing.

W. H. O'Brien

Civil Engineer

WHO:jad

STATE OF CONNECTICUT
Department of Environmental Protection
Water and Related Resources

HYDROLOGIC STUDY
of
MESSERSCHMIDT POND WATERSHED
and
REPORT
on
MESSERSCHMIDT DAM
Westbrook, Connecticut

June 1973



ROALD HAESTAD, INC.
Consulting Engineers
751 West Main Street
Waterbury, Connecticut
06708

TABLE OF CONTENTS

	<u>Pages</u>
Index to Figures	i-2
Scope of Report and Existing Conditions	1 - 3
Study Procedures	3 - 9
Hydrographs, Discharge Curves, & Spillway Profile	10 - 15
Summary and Conclusions	16 - 17
Appendix A - Sample Computations	A-1 & A-2

INDEX TO FIGURES

<u>Figure No.</u>		<u>Page No.</u>
1	Messerschmidt Pond Watershed	2
2	Spillway Rating Curve	4
3	Stage-Capacity Curve	5
4	Rainfall Intensity - Duration Curves	8
5	Extrapolated Rainfall Intensity-Duration Curves	9
6	Inflow-Outflow Hydrograph 100 Year Storm	10
7	Inflow-Outflow Hydrograph 400 Year Storm	11
8	Inflow-Outflow Hydrograph 1000 Year Storm	12
9	Inflow-Outflow Hydrograph Probable Maximum Precipitation	13
10	Discharge Curves	14
11	Existing Spillway Profile	15

HYDROLOGIC STUDY OF MESSERSCHMIDT POND WATERSHED
and
REPORT ON MESSERSCHMIDT DAM

Westbrook, Connecticut

The purpose of this study and report is to evaluate the safety of the Messerschmidt Dam. In order to do so, we have inspected the dam and downstream condition, and made a hydrologic study of the watershed to arrive at flood conditions.

EXISTING CONDITIONS

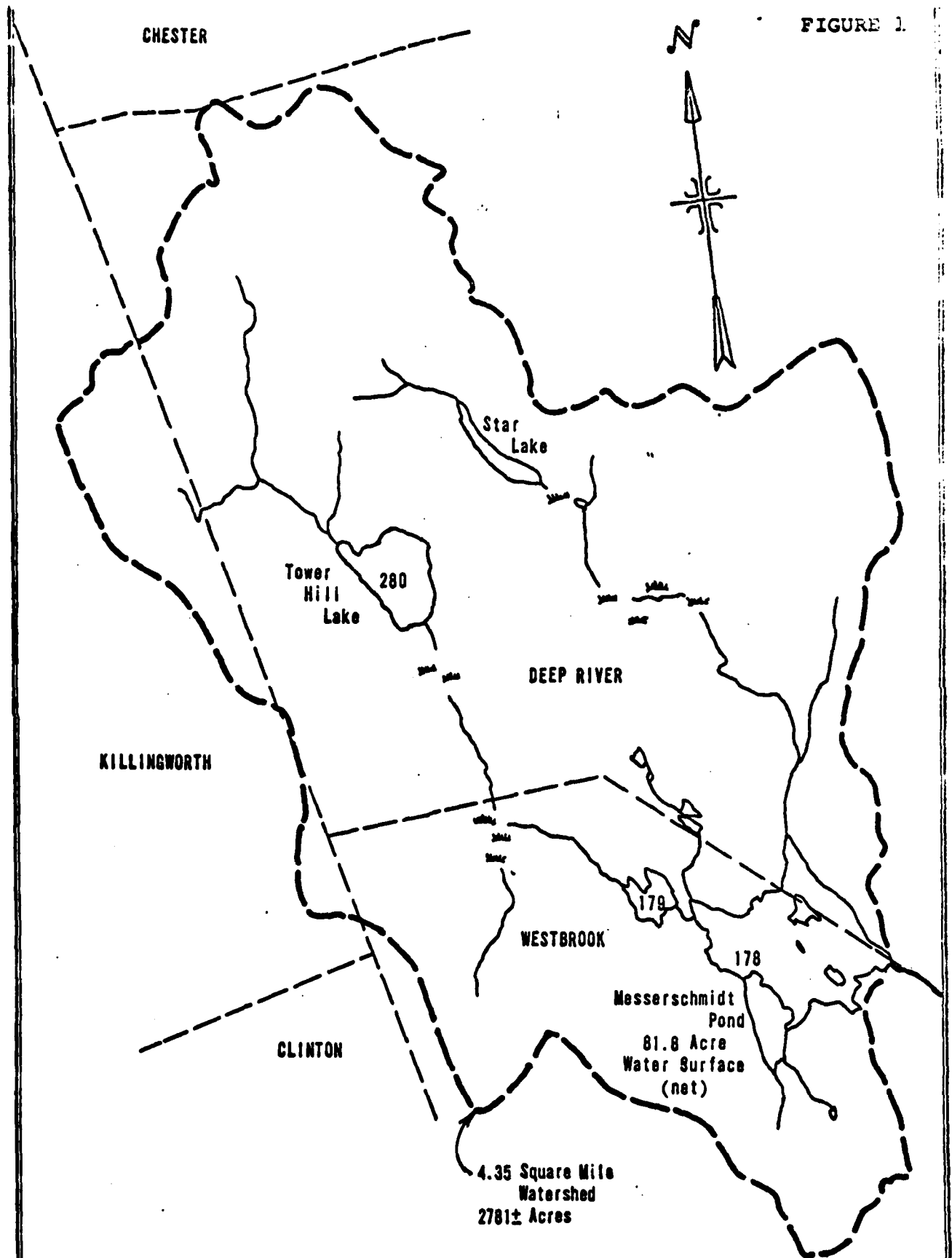
Messerschmidt Pond has a water surface of approximately 81.8 acres and a watershed on 4.35 square miles. The pond discharges through 3 spillways, a main spillway 58 feet long and two auxiliary spillways 75 and 60 feet in length, that are at a slightly higher elevation than the main spillway. There are flash boards on all three spillways.

The south retaining wall of the main spillway is in need of repair. The concrete has deteriorated to the extent that there are cavities in the wall. There are also cavities in the center section of the main spillway, immediately below the crest of the dam.

In addition to the spillways there are 3 dikes totaling about 500 feet, and having a freeboard of approximately 4 feet.

The Messerschmidt factory is built into the main dam forming a barrier approximately 35 feet wide.

FIGURE 1.



MESSERSCHMIDT POND WATERSHED

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

General Data:

Spillway elevation from U.S.G.S. datum:	178 feet
Surface area:	81.8 acres
Drainage area:	4.35 square miles

STUDY PROCEDURES

1. The three spillways and the dikes were inspected and measured. Overflows at various spillway elevations were computed to obtain a spillway rating curve. See Figure 2.

2. Surface areas at various spillway elevations were obtained by using a planimeter on USGS maps. Storage capacities were calculated and plotted against the spillway elevation to obtain a Stage-Capacity curve. See Figure 3.

3. The length of stream and elevations were obtained from USGS maps to calculate the time of concentration (T_c) for the pond. T_c is defined as the amount of time for water to travel from the most distant point in the watershed to the point of interest.

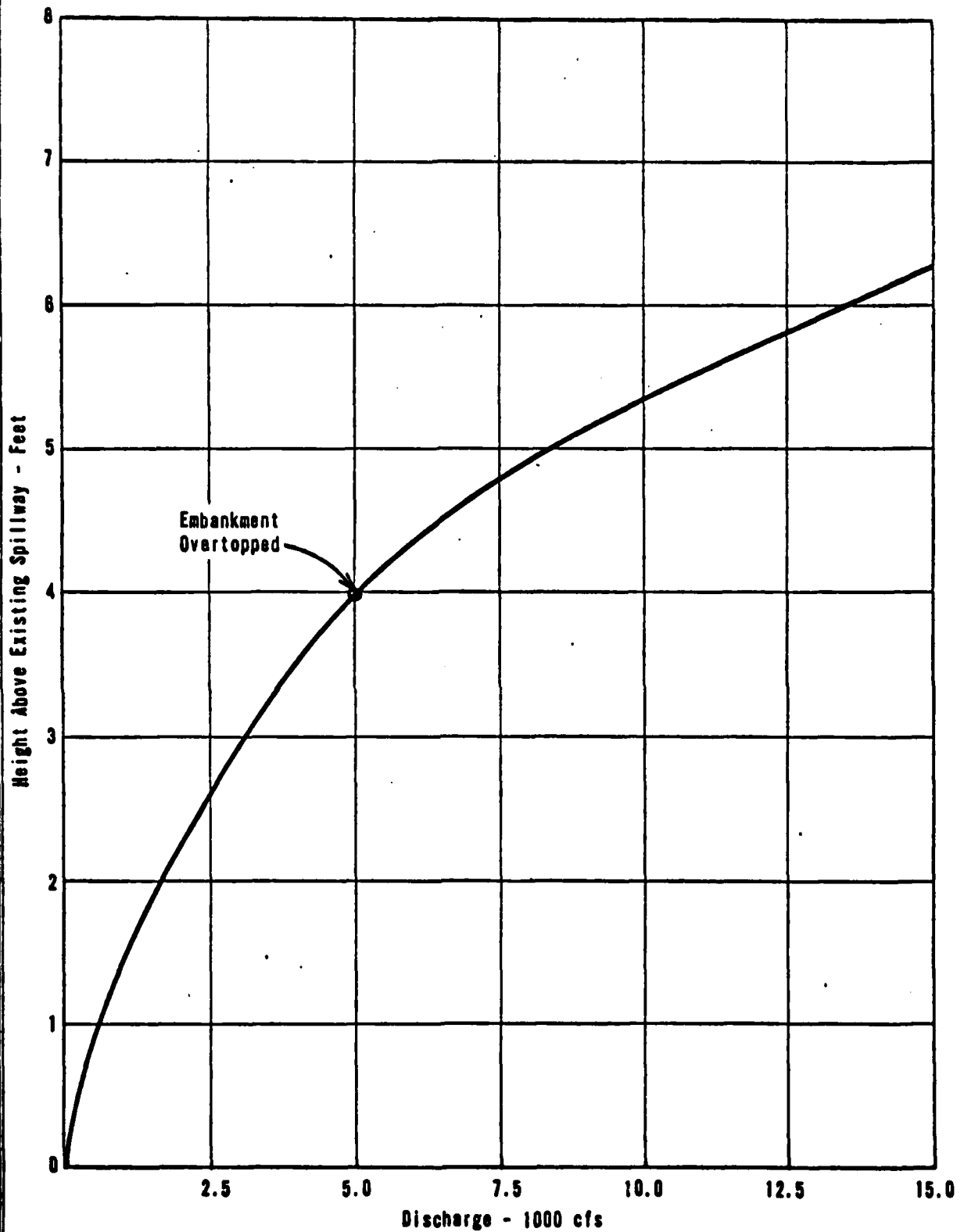
4. The spillway capacities were evaluated against 4 storms as follows:

A storm of 3 hours duration with a return frequency of 100 years yielding 4.0 inches of rainfall.

A storm of 3 hour duration with a return frequency of 400 years yielding 4.6 inches of rainfall.

A storm of 3 hours duration with a return frequency of 1000 years yielding 5.1 inches of rainfall.

FIGURE 2



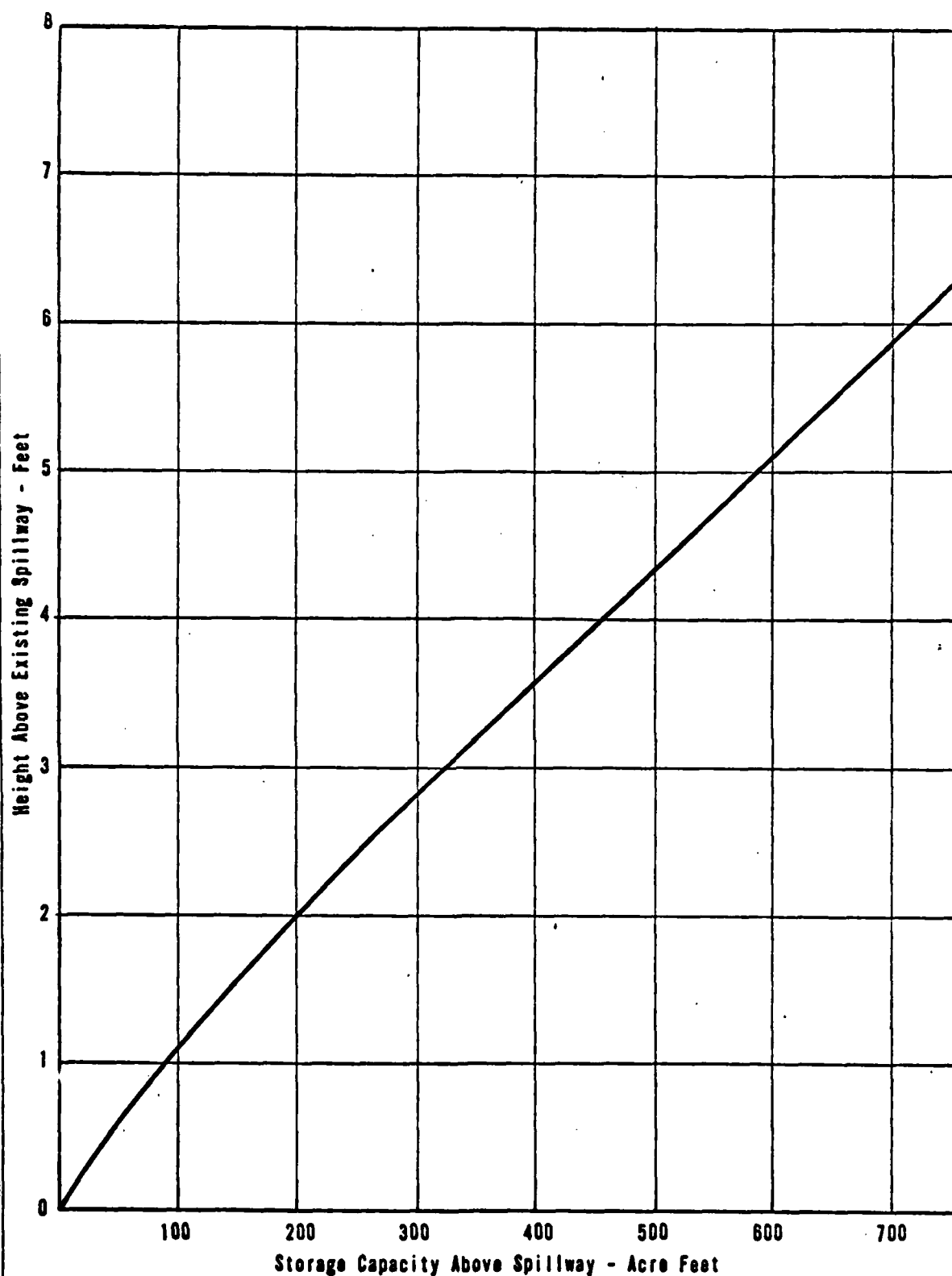
MESSERSCHMIDT DAM
SPILLWAY RATING CURVE

ROALD HAESTAD, INC
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
B-17 Water and Related Resources

FIGURE 3



MESSERSCHMIDT DAM
STAGE-CAPACITY CURVE

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

A storm of 6 hour duration with a probable maximum precipitation (PMP) yielding 24.5 inches of rainfall.

The figures for the 400 and 1000 year storm were extrapolated from U. S. Weather Bureau Technical Paper 29.

The extrapolations for the 400 and 1000 year storms were made on Gumbel Probability paper. Log-Log paper was used to interpolate the intermediate hourly accumulations. See Figures 4 and 5.

A set of sample calculations are shown in Appendix A.

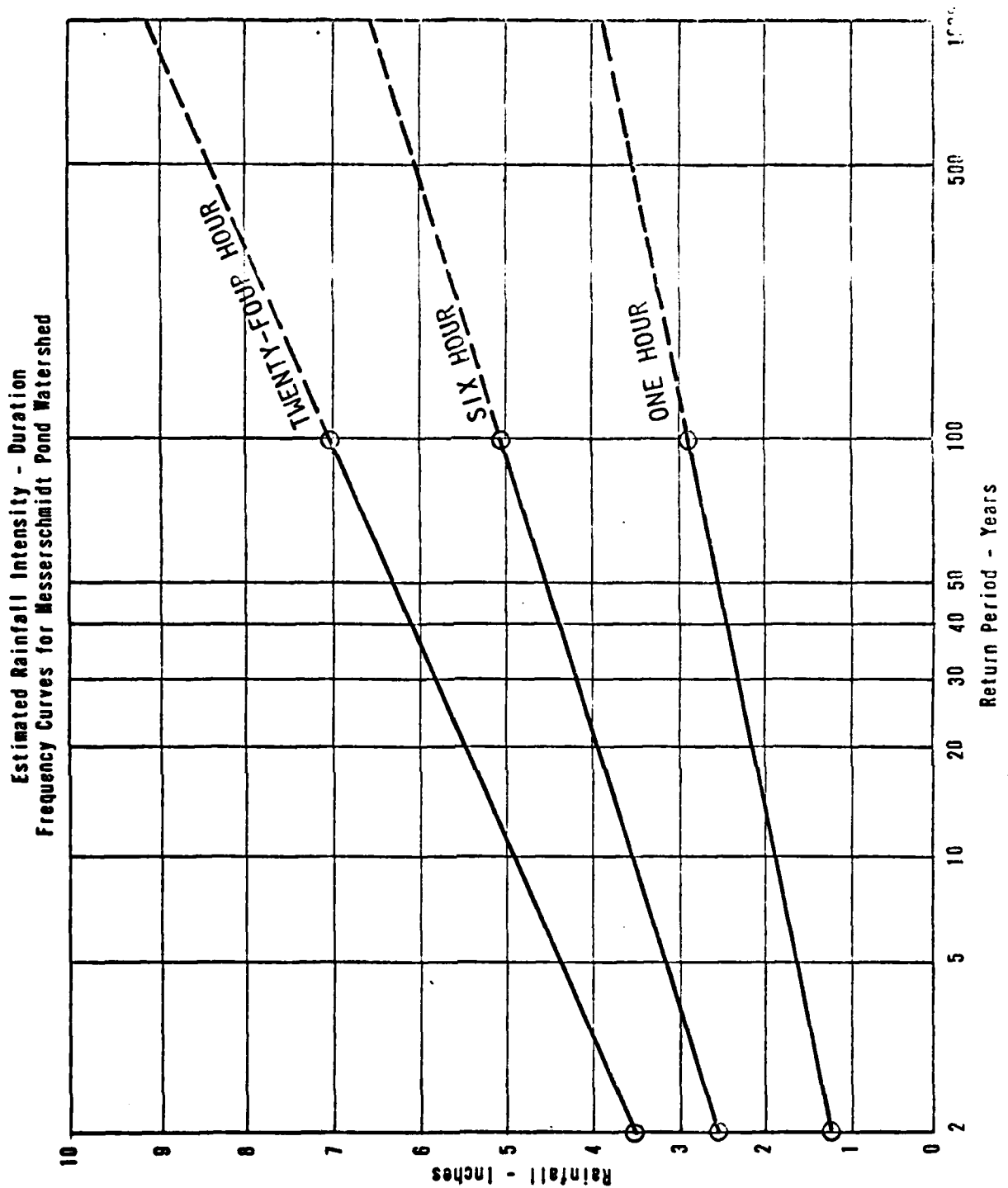
"Design of Small Dams" by the Bureau of Reclamation, 1960, describes probable maximum precipitation for a particular area, as representing "an envelopment of depth-duration-area rainfall relations for ALL storm types characteristic to that area adjusted meteorologically to maximum conditions....". An evaluation of PMP was considered necessary since failure of the Messerschmidt Pond Dam might result in the loss of human life.

Hydrographs of the various storms were developed using, in general, the methodology outline in "Design of Small Dams". The Inflow-Outflow Hydrographs for the 4 storms are shown in Figures 6 through 9. Summary discharge curves are shown on Figure 10, and indicates the height above the existing spillway that outflows, from the storms of the various frequencies, would reach.

Assumptions:

1. A storm duration of 3 hours was used since this is greater than the time of concentration for the watershed.
2. To obtain a runoff coefficient the area was evaluated by considering the amount of woodland, highways, water surface and other conditions affecting surface runoff. A classification of "Woods - fair" from "Design of Small Dams" (Appendix A, Table A-2, page 426) was selected, giving a runoff coefficient of 73. This was weighted with the highway area with a coefficient of 90, and water surface area with a coefficient of 100. A weighted runoff coefficient of 74 was obtained.
3. Spillway profiles were modified slightly to simplify calculations. Figure 11 shows the configuration of the spillway as used in the calculations.

FIGURE 4



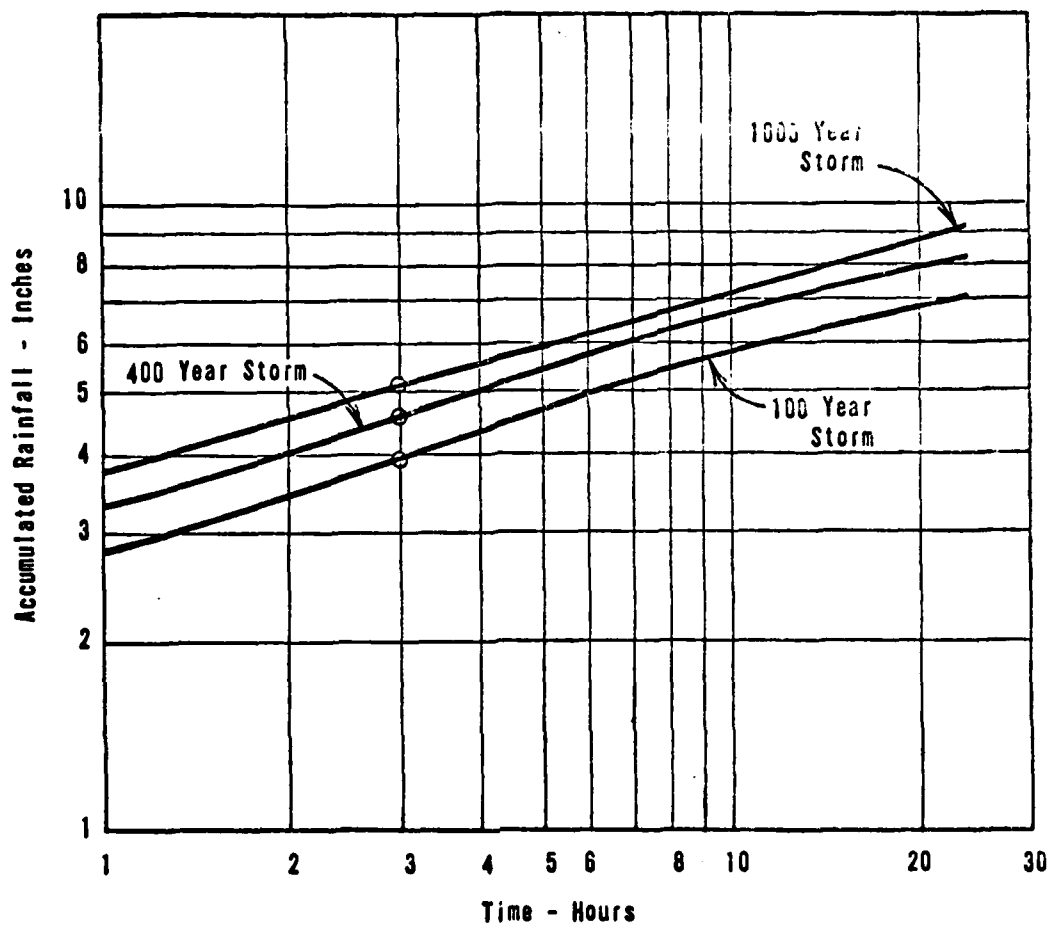
MESSERSCHMIDT DAM
RAINFALL INTENSITY - DURATION

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources
B-21

FIGURE 5



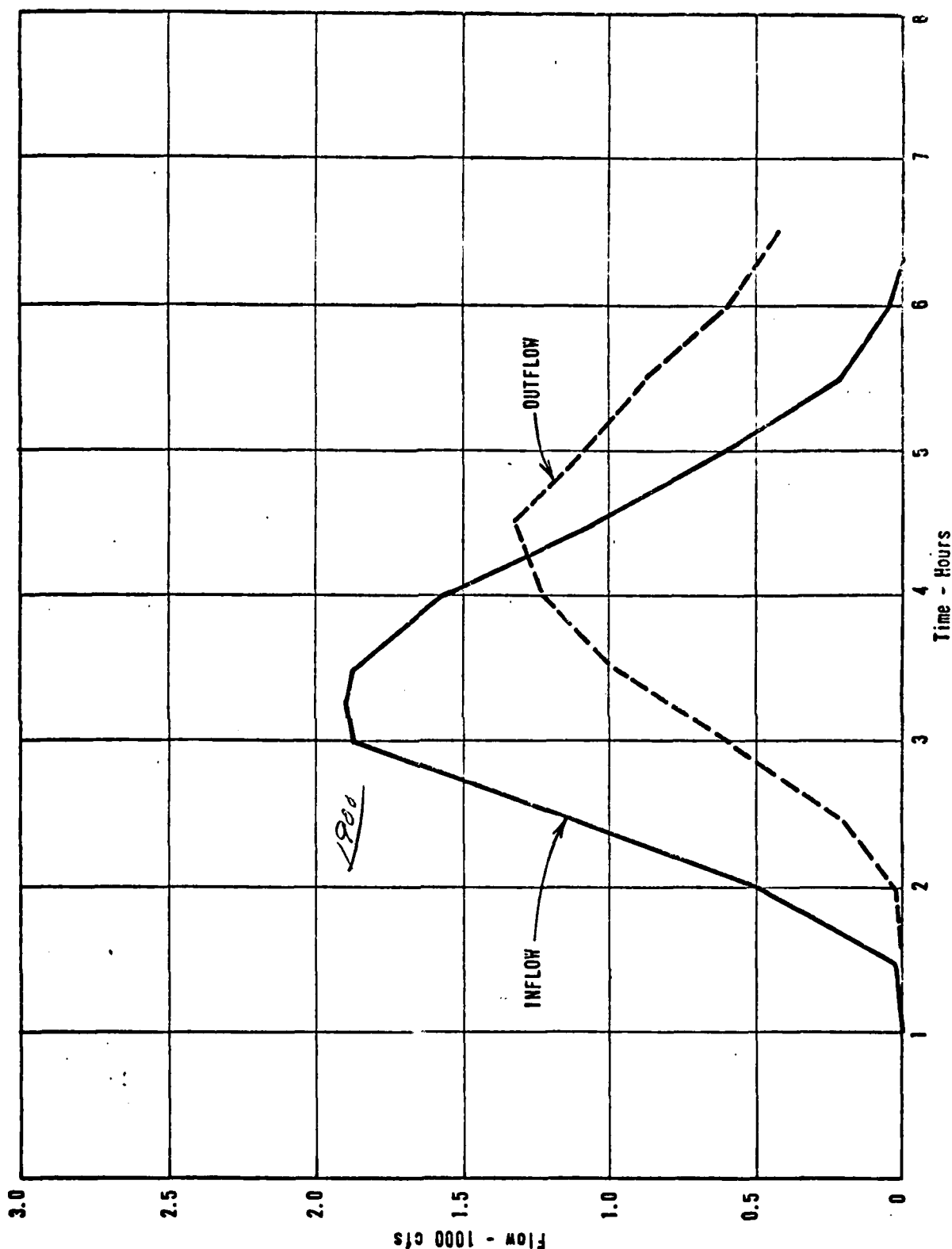
MESSERSCHMIDT DAM
EXTRAPOLATED RAINFALL
INTENSITY-DURATION CURVES

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

FIGURE 6



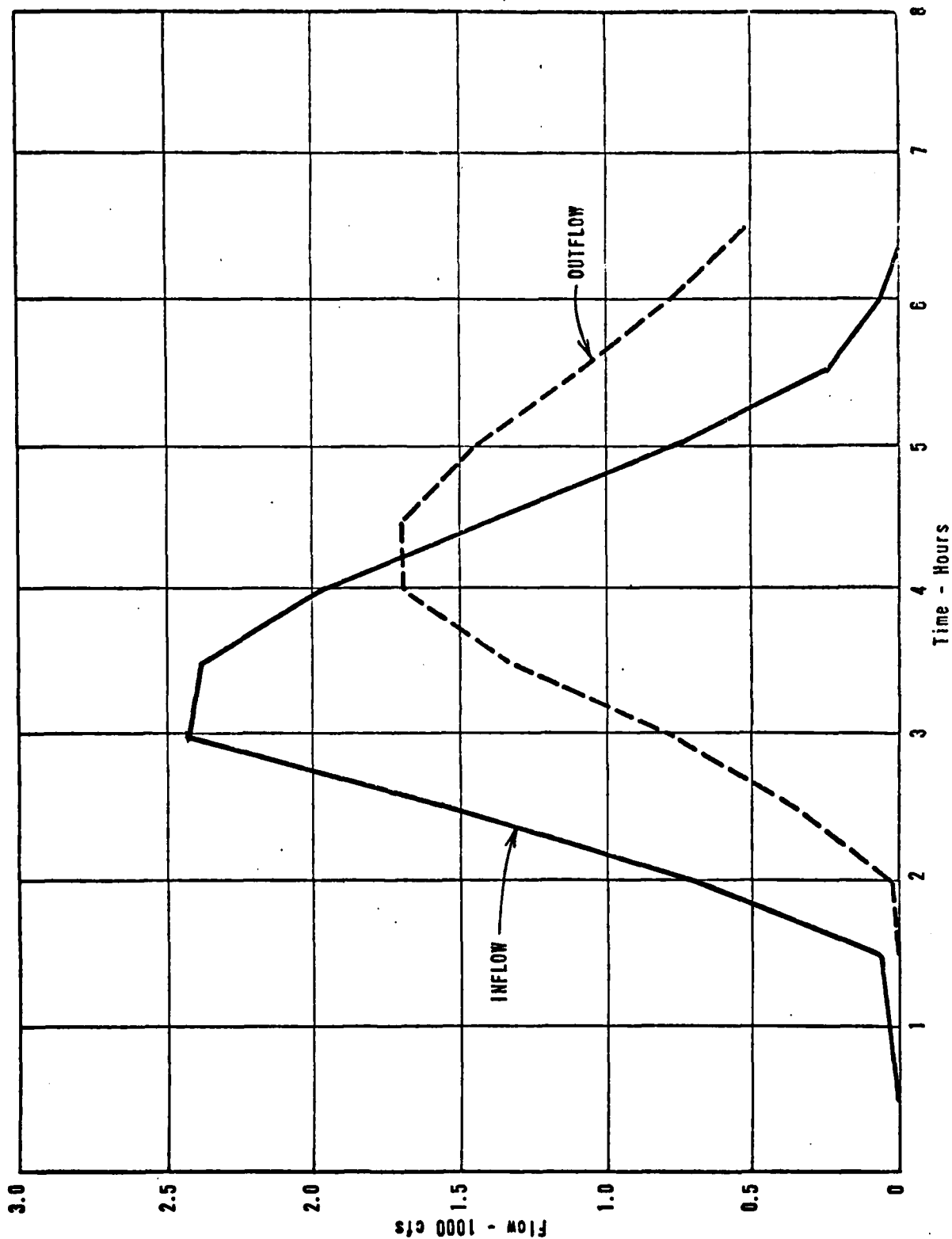
MESSERSCHMIDT DAM
INFLOW-OUTFLOW HYDROGRAPH
100 YEAR STORM

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

FIGURE 7



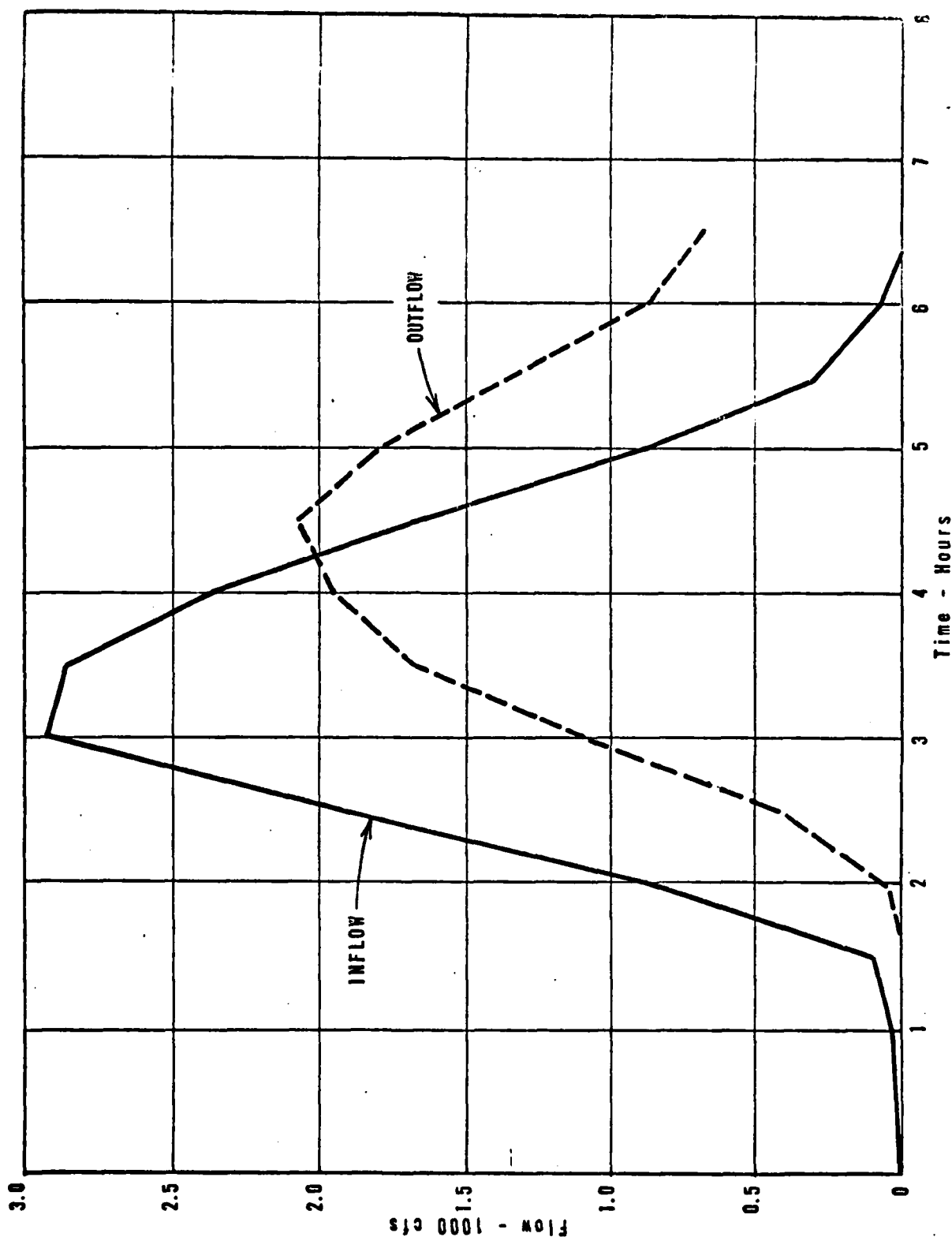
MESSERSCHMIDT DAM
INFLOW-OUTFLOW HYDROGRAPH
400 YEAR STORM

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept. of Environmental Protection
Water and Related Resources

FIGURE 8



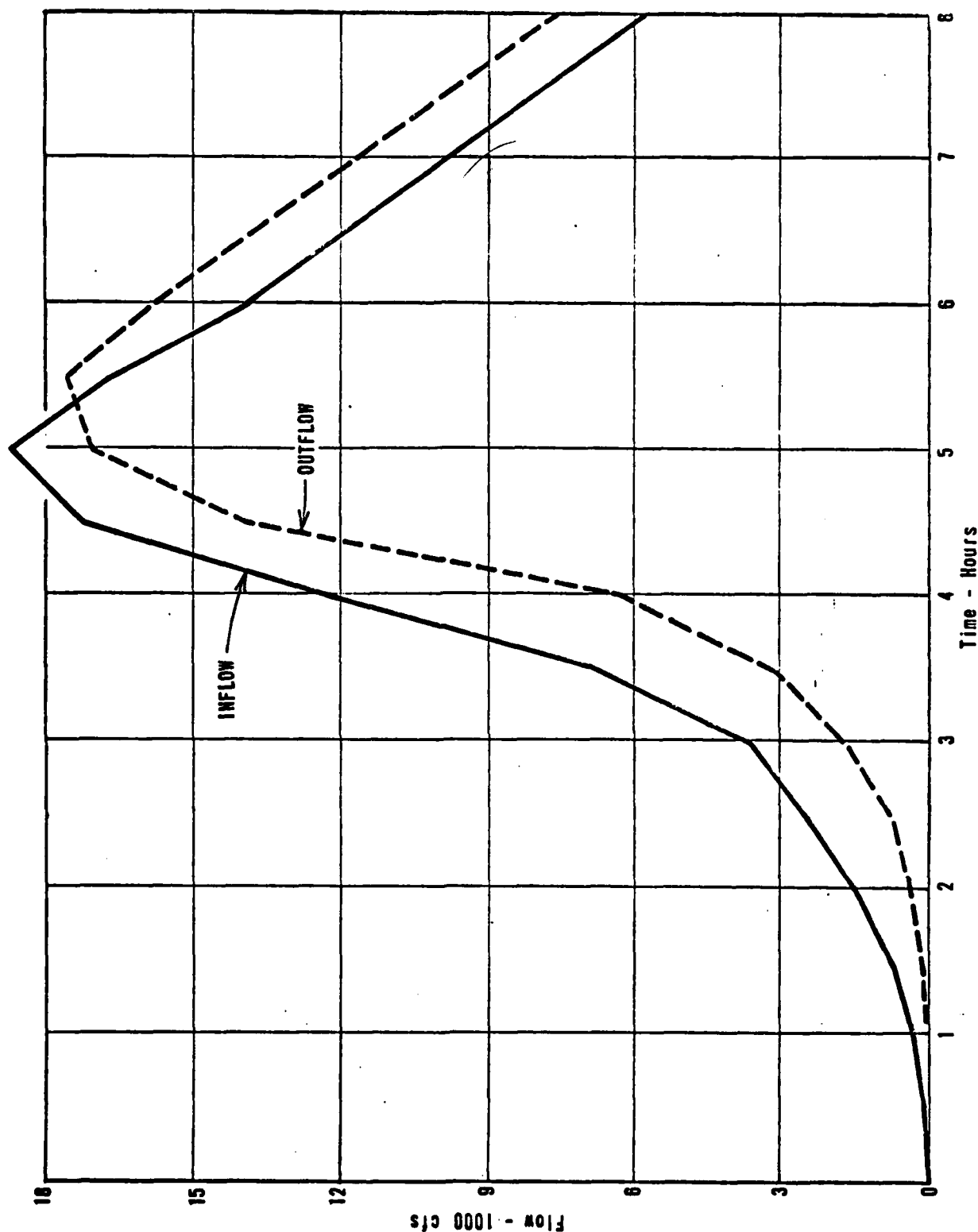
MESSERSCHMIDT DAM
INFLOW-OUTFLOW HYDROGRAPH
1000 YEAR STORM

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

FIGURE 9



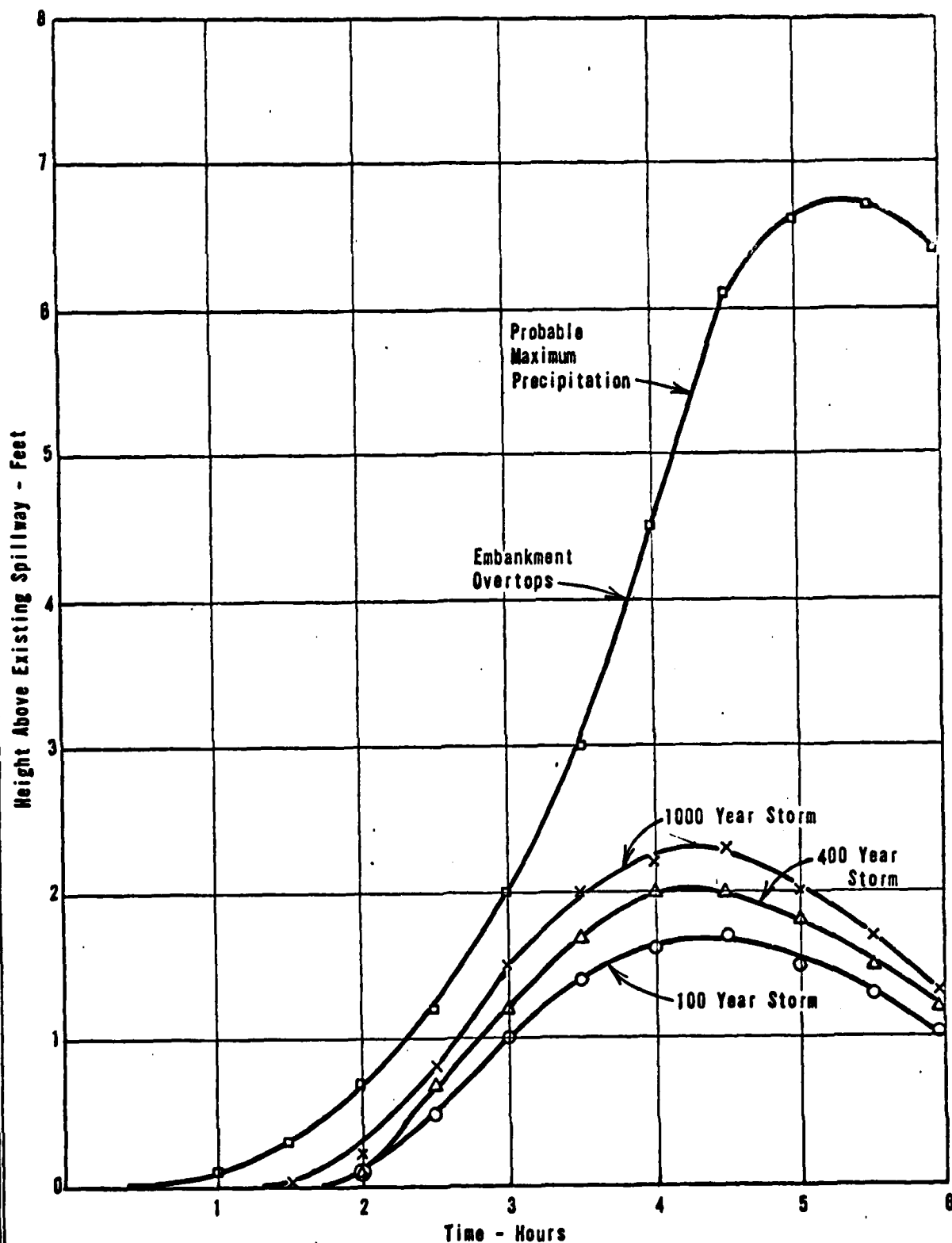
MESSERSCHMIDT DAM
INFLOW-OUTFLOW HYDROGRAPH
PROBABLE MAXIMUM PRECIPITATION

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

FIGURE 10



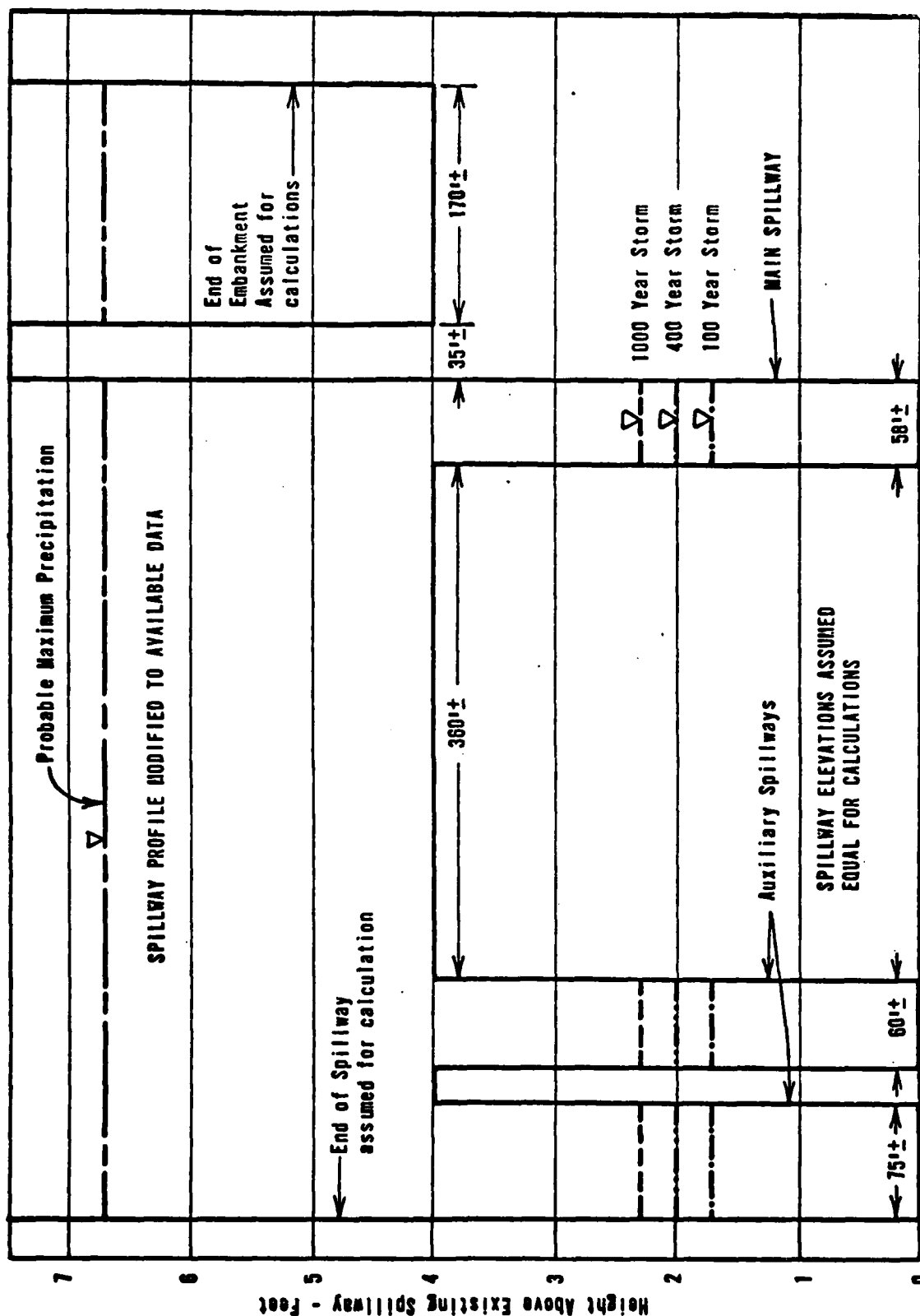
MESSERSCHMIDT DAM
DISCHARGE CURVES

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

FIGURE 11



MESSERSCHMIDT DAM
EXISTING SPILLWAY PROFILE

ROALD HAESTAD, INC.
Consulting Engineers
Waterbury, Connecticut

JUNE 1973

STATE OF CONNECTICUT
Dept of Environmental Protection
Water and Related Resources

SUMMARY AND CONCLUSIONS

Messerschmidt Dam has several deficiencies which adversely affect the safety of the structure and should be corrected in the immediate future.

The auxiliary spillways are over-grown with brush and trees. These should be removed so as not to restrict the flow of water in time of flooding.

The flashboards on all three spillways should be removed to increase the capacity of the spillways.

The south retaining wall of the main spillway should be repaired or replaced.

The cavities in the center of the main spillway should be repaired.

Additional modifications to the spillways and dikes are required to safely discharge a 1000 year storm. The retaining walls and dikes should be enlarged to provide at least 3 feet of freeboard above the 1000 year flood stage.

The masonry core of the dike to the south and west of the main spillway is located on the downstream side of center and should this dike be overtopped, the core wall could topple. The downstream slope is fairly steep in this area and the embankment could be enlarged and widened to provide both adequate freeboard and stability.

The probable maximum precipitation storm so completely overpowers all facilities that the pond has little retarding

effect on the flow. In the event of a storm with PMP, the dam would be overtopped, and in all likelihood would fail.

As a means of visualizing the significance of the PMP storm; at the peak inflow rate. it would take only 12 minutes to equal the entire volume of the pond at existing spillway level.

Construction of dikes and spillways to contain the PMP storm is not considered economically feasible because of the extremely remote possibility of a storm of this magnitude ever occurring. However, the dikes and spillways should be constructed to withstand a storm of this magnitude with some damage, or to fail gradually and release the impounded water over a considerable period of time.

Engineering drawings of the dam and dikes are not available.

The pond should be drained and detailed drawings made of the structures.

APPENDIX A

BY...DLS... DATE...6/1/73...

ROALD HAESTAD, INC.

CONSULTING ENGINEERS

751 West Main Street • Waterbury, Conn. 06708

SHEET NO..... OF.....

CHKD. BY..... DATE.....

JOB NO.....

SUBJECT:MESSERSCHMIDT DAM.....

1000 YEAR STORM: 5.1" 3 hr duration

DRAINAGE AREA = 4.35 sq. mi.

HOURS	Δ RAIN	Σ RAIN	Σ RUN	Δ RUN	Δ LOSS
0-1/2	0.41	0.41	0.00	0.00	0.41
1/2-1	0.45	0.86	0.03	0.03	0.42
1-1 1/2	0.57	1.43	0.14	0.11	0.46
1 1/2-2	2.50	3.93	1.57	1.43	1.07
2-2 1/2	0.76	4.69	2.14	0.58	0.18
2 1/2-3	0.41	5.10	2.47	0.33	0.08

$$T_c = 2.0 \text{ hrs} \quad T_p = \frac{1}{2} + 0.6 T_c = 1.45 \quad T_b = 2.67 \quad T_p = 3.87$$

$$D = 0.5 \quad q_p = \frac{484 A Q}{T_p} = 1452$$

HOURS	Δ RUN	q_p 1.0"	$q_p \times$ Δ RUN	Δ HYDROGRAPH D	T_p	T_b	TOTAL
0-0.5	0.00	1452	0.0	0	1.45	3.87	✓ 00 .5
0.5-1.0	0.03	1452	58	0.5	1.95	4.37	✓ 20 1.0
1.0-1.5	0.11	1452	1.60	1.0	2.45	4.87	✓ 95 1.5
1.5-2.0	1.43	1452	2076	1.5	2.95	5.37	883 2.0
2.0-2.5	0.58	1452	842	2.0	3.45	5.87	1924 2.5
2.5-3.0	0.33	1452	479	2.5	3.95	6.37	2935 3.0
							2870 3.5
							2361 4.0
							1617 4.5
							891 5.0
							301 5.5

BY: DLS DATE: 6/4/73

ROALD HAESTAD, INC.

CONSULTING ENGINEERS

SHEET NO. _____ OF _____

CHKD. BY: _____ DATE: _____

751 West Main Street • Waterbury, Conn. 06708

JOB NO: _____

SUBJECT: MESSERSCHMIDT DAM

1000 YEAR STORM

TIME HOURS	ΔT	AVERAGE RATE OF INFLOW Q _i AT SECT.	AVERAGE INFLOW ACRE- FEET	TRIAL RES. STORAGE EL. END OF Δt	AVERAGE RATE OF OUTFLOW Q _o SECT.	AVERAGE OUTFLOW FOR Δt ACRE- FEET	INCREMENTAL STORAGE, ΔS ACRE- FEET	TOTAL STORAGE ACRE- FEET	RESERVOIR ELEVATION END OF Δt
0									
0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0	0.5	1.0	0.4	0.0	0.0	0.0	0.4	0.4	0.0 ok
1.5	0.5	5.8	2.4	0.0	0.0	0.0	2.4	2.8	0.0 ok
2.0	0.5	48.9	2.0	0.2	2.7	1.1	18.9	21.7	0.12 ok
2.5	0.5	140.0	5.8	0.8	24.1	1.0	4.8	7.0	0.18 ok
3.0	0.5	243.0	10.1	1.5	76.4	3.2	6.9	13.9	1.5 ok
3.5	0.5	290.0	12.1	2.0	139.5	5.8	6.3	20.2	2.0 ok
4.0	0.5	261.5	10.9	2.2	182.2	7.6	3.3	23.5	2.25 ok
4.5	0.5	199.0	8.3	2.3	202.0	8.4	-1	23.4	2.25 ok
5.0	0.5	125.5	5.2	2.0	189.0	7.9	-2.7	20.7	2.0 ok
5.5	0.5	59.6	2.5	1.5	139.6	5.8	-3.3	17.4	1.8
6.0	0.5	18.7	7.8	1.7	150.9	6.3	-3.8	16.9	1.7 ok
6.5	0.5	3.6	1.5	1.3	110.7	4.6	-3.8	13.1	1.3 ok
7.0	0.5			1.0	74.3	3.1	-2.9	10.2	1.1
7.5	0.5			1.1	78.7	3.3	-3.1	10.0	1.1 ok

Deep River, Conn.
R.R. 1, Westbrook Rd.

December 3, 1973

State of Conn.
Department of Environmental Protection
Water & Related Resources Unit
State Office Building
Hartford, Conn. 06115

Att: Mr. Victor F. Galgowski
Supt. of Dam Maintenance

Re: Messerschmidt Pond Dam
Westbrook

Dear Mr. Galgowski:

I am listing herewith a progress report on maintenance work completed on the Messerschmidt Dam.

- a. The cavity in the center of the spillway has been filled and concreted.
- b. The south retaining wall has been repaired and was also raised to match the level of the top of the dam.
- c. The brush on the auxiliary spillways has been cut and removed.

I think we have everything squared away. If you should be coming down this way, I can be reached at 399-6174 and we could go over the work done to see if everything checks out satisfactory.

Sincerely yours,

Charles Messerschmidt

Charles Messerschmidt

WATER & RELATED
RESOURCES
RECEIVED

DEC 6 1973

ANSWERED _____
REFERRED _____
FILED _____

Interdepartment Message

STO-201 REV. 3 77 STATE OF CONNECTICUT
(Stock No 6938-051-01)

SAVE TIME: *Handwritten messages are acceptable.*

Use carbon if you really need a copy. If typewritten, ignore faint lines.

To	NAME	Victor F. Galgowski	TITLE	Supt. of Dam Maintenance	DATE	8 December 1978
	AGENCY	Environmental Protection	ADDRESS			
From	NAME	Charles J. Pelletier	TITLE	Consultant	TELEPHONE	
	AGENCY	Environmental Protection	ADDRESS			
SUBJECT Messerschmidt Dam, Westbrook						

A surficial inspection of this dam was made on November 30, 1978. The structure is little changed from previous inspections.

The following conditions were noted:

1. Some of the rocks at the downstream toe of the spillway have been displaced.
2. There is seepage at the downstream toe of the earth slope about 100 feet south from the spillway.
3. There are trees on the embankment slope south from the spillway - some have been topped.
4. The emergency spillway at the south end of the dam has become overgrown and has reduced capacity.

We recommend that the trees be removed, the emergency spillway be restored and that the rock spillway slope be repaired.

The seepage is not substantial, but should be monitored so that any significant increase in flow will not go unnoticed.


Water Resources Unit

CJP:ljc

SAVE TIME: *If convenient, handwrite reply to sender on this same sheet.*

APPENDIX C

DETAIL PHOTOGRAPHS

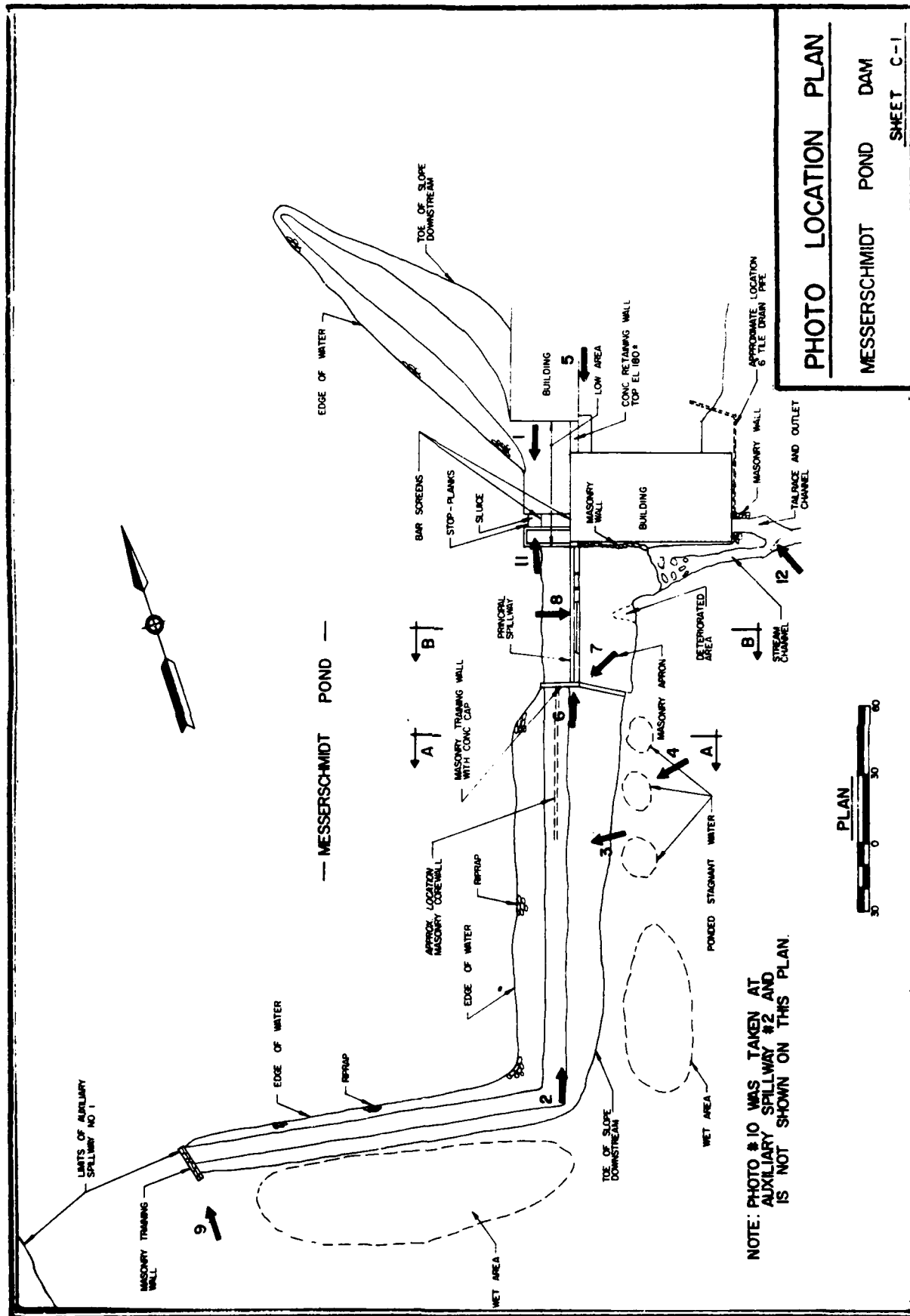


PHOTO LOCATION PLAN

MESSERSCHMIDT POND DAM
SHEET C-1



Photo 1 - General view of left and central embankments principal spillway, sluice and factory building (Sept 1979)



Photo 2 - Crest of central embankment from right end (Sept 1979)

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

Messerschmidt Pond Dam

Falls River

Westbrook, Connecticut

CE #27 660 KD

DATE Nov 1979 PAGE C-1



Photo 3 - Erosion on downstream slope of central embankment near principal spillway (Sept 1979)

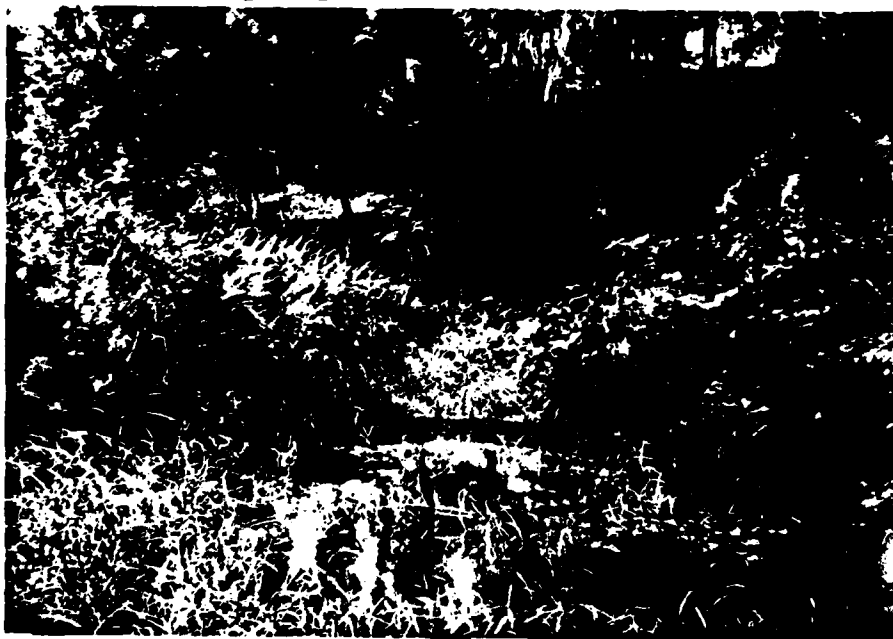


Photo 4 - Pond of seepage water at the wet and swampy area at toe of central embankment (Sept 1979)

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

Messerschmidt Pond Dam
Falls River
Westbrook, Connecticut

CE #27 660 KD

DATE Nov 79 PAGE C-2

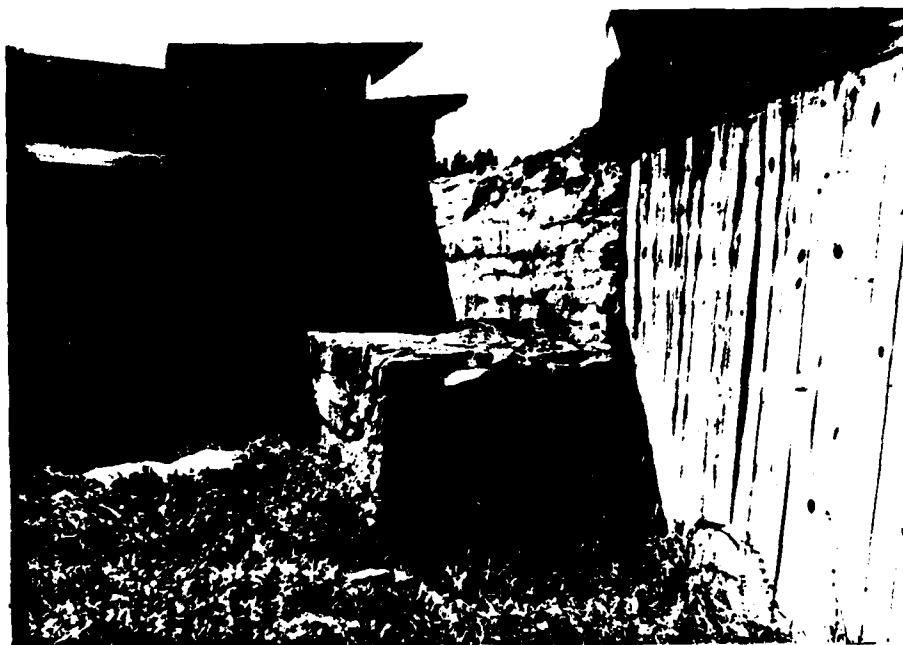


Photo 5 - Concrete retaining wall of left embankment (Sept 1979)



Photo 6 - Crest, apron and left training wall of principal spillway (Sept 1979)

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

Messerschmidt Pond Dam
Falls River
Westbrook, Connecticut

CE# 27 660 KD

DATE Nov 1979 PAGE C-3



Photo 7 - Right training wall of principal spillway (Sept 1979)



Photo 8 - Apron and downstream channel of principal spillway
(Sept. 1979)

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

Messerschmidt Pond Dam
Falls River
Westbrook, Connecticut
CE #27 660 KD
DATE Nov 79 PAGE C-4



Photo 9 - Crest and left masonry training wall of Auxiliary Spillway #1 (Sept 1979)



Photo 10 - Concrete sill on crest of Auxiliary Spillway #2 (Sept 1979)

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

Messerschmidt Pond Dam
Falls River

Westbrook, Connecticut

CE #27 660 KD

DATE Nov 79 PAGE C-5



Photo 11 - Stop-planks (left) and bar screen for intake sluice (Sept 1979)



Photo 12 - Tailrace, outlet for 6" tile drain pipe in masonry wall and discharge channel (Sept 1979)

US ARMY ENGINEER DIV. NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

CAHN ENGINEERS INC.
WALLINGFORD, CONN.
ENGINEER

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

Messerschmidt Pond Dam
Falls River

Westbrook, Connecticut

CE# 27 660 KD

DATE Nov 79 PAGE C-6

APPENDIX D
HYDRAULICS/HYDROLOGIC COMPUTATIONS

Project NON-FEDERAL DAMS INSPECTION

Sheet D-2 of 17

Computed By VW

Checked By GAB

Date 10/10/79

Field Book Ref. _____

Other Refs. CE # 27-660-HA

Revisions _____

MEIERSCHMIDT POND DAM

2.2 - Cont'd) CLASSIFICATION - SIZE

STORAGE: FROM U.S. INVENTORY OF DAMS, DATED 1/24/79, P. 34. THE OWNER'S ESTIMATE OF AVERAGE DEPTH (6' - 8') AND C.E. MEASURE OF LAKE AREA AT VARIOUS ELEVATIONS IN U.S.G.S., ESSEX, CT. QUAD. SHEET (AREA AT F.W. LANE: $A \approx 85.5 \text{ AC}$; AT CONTOUR 180' MSL: $A \approx 101 \text{ AC}$; AT CONTOUR 190' MSL: $A \approx 165 \text{ AC}$; $\therefore \bar{A}$ TO EXPECTED SURCHARGE: $\bar{A} \approx 100 \text{ AC}$; $\therefore S \approx 85.5 \times 8 + 100 \times 2 = 880 \text{ ACFT}$); ESTIMATE BY APPROXIMATE FORMULA: $S \approx 0.5 \times 85.5 \times 24 = 1000 \text{ ACFT}$; AND BY GRAPHICAL EXTRA-POLATION $S \approx 900 \text{ ACFT}$, SHOW THE GIVEN FIGURE TO BE WITHIN THE RANGE OF THE ACTUAL FIGURE.

HEIGHT: FROM C.E. SURVEY/FIELD OBSERVATIONS: TOP OF MAIN PORTION OF EMBANKMENT $\pm \text{ELEV.}^* 182 \text{ MSL}$; TOP OF CONCRETE WALLS ENCLOSING EARTH FILL AT LOW SECTION OF DAM (SEE NOTE P.D-1), $\pm \text{ELEV.}^* 180 \text{ MSL}$; STREAM AT TOE OF DAM (TAILRACE OF TURBINE AT FACTORY BLDG.) $\pm \text{ELEV.}^* 156 \text{ MSL}$. $\therefore H \approx 24'$ TO LOW SECTION OF DAM.

- b) HAZARD POTENTIAL: THE DAM IS LOCATED ON FALLS RIVER (\approx) 3000' $\frac{1}{2}$ MI FROM WRIGHTS POND. THIS REACH OF THE RIVER, EXCEPT FOR THE FACTORY AND ONE HOUSE JUST $\frac{1}{4}$ MI FROM THE DAM, BOTH ABANDONED, IS UNDEVELOPED AT PRESENT. $\frac{1}{2}$ MI FROM WRIGHTS POND ONE HOUSE IS AT THE LEVEL OF THE SPILLWAY AND (\approx) 1200' $\frac{1}{4}$ MI TWO HOMES HAVE FIRST FLOORS LESS THAN 6' ABOVE THE STREAM. UPON FAILURE OF MEIERSCHMIDT DAM THESE HOMES MAY BE AFFECTED BY THE OVERFLOW OF WRIGHTS POND WHICH IN TURN IS EXPECTED TO BE SERIOUSLY OVERTOPPED. OTHER HOUSES ALONG DENNISON RD. ARE (3) 8' ABOVE THE STREAM.

* NOTE: MSL ELEV. BASED ON THE ASSUMPTION OF PRINCIPAL SPILLWAY CREST ELEV. TO BE EQUIVALENT TO MSL ELEV. 178' MSL SHOWN ON THE 1958 (PHOTOREY. 1970) U.S.G.S., ESSEX, CT. QUAD. SHEET.

Project NON-FEDERAL DAM INSPECTION

Sheet D-3 of 17

Computed By HLL

Checked By GAB

Date 10/10/79

Old Book Ref

Other Refs CE #27-660-HA

Revisions

MEJERSCHMIDT POND DAM

2, c) CLASSIFICATION

SIZE: SMALL

HAZARD: HIGH

3) TEST FLOOD (PEAK INFLOW):

$$Q_R = PMF = \underline{7500 \text{ CFS}}$$

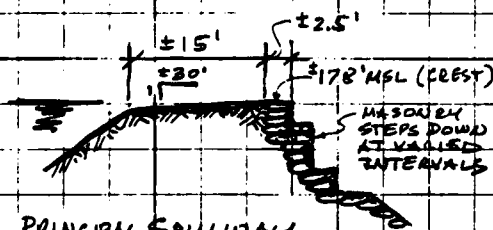
$$Q_R' = \frac{1}{2} PMF = 3750 \text{ CFS}$$

4) SURCHARGE AT PEAK INFLOW:

a) OUTFLOW RATING CURVE

i) SPILLWAYS

THE PRINCIPAL SPILLWAY, TO THE RIGHT OF THE FACTORY BUILDING IS A STONE MASONRY BROAD CRESTED WEIR (±) 63' LONG WITH SLUICING UP FACE AND VERTICAL (STEPPED) D/S FACE. (SEE SKETCH). THE BREADTH OF THE CREST IS (±) 2.5'. THE HEIGHT OF THE RIGHT SIDE WALL (STONE



PRINCIPAL SPILLWAY

TYPICAL CROSS SECTION

MASONRY WITH A (±) 1.5' HIGH CONCRETE CAP) IS (±) H=4.5'; THE LEFT SIDE WALL (CONCRETE MASONRY WALL ALONG THE FACTORY BLDG.) IS H=2'.

NOTE: DIMENSIONS FROM C.E. FIELD INSP. ON 9/18/79

TO THE RIGHT OF THE DAM THERE ARE TWO NATURAL GROUND DEPRESSIONS THAT SERVE AS AUXILIARY SPILLWAYS. THE FIRST ONE, (AUXILIARY SPILLWAY #1) FOLLOWS THE MAIN EMBANKMENT OF THE DAM WHICH ENDS IN A MASONRY WALL (±) 2.5' HIGH, TO THE RIGHT.

D-3

Object NON-FEDERAL DAMS INSPECTION

Sheet D-4 of 17

Computed By HLL

Checked By GRB

Date 10/10/79

Field Book Ref. _____

Other Refs. CE#27-660-HA

Revisions _____

MESSEKSCHEMIDT POND DAM

4.2 - CONT'D) OUTFLOW RATING CURVE - SPILLWAYS

THERE IS NO SILL OR OTHER PHYSICAL MEANS TO DEFINE A TRUE SECTION ON THIS DEPRESSION, COVERED BY TALL AND THICK BRUSH. HOWEVER, FROM C.E. SURVEY ON 9/18/79 A DEPRESSION ABOUT 60' LONG, AT (±) ELEV. 179.5' ASL, FOLLOWED TO THE RIGHT BY TERRAIN AT (±) 16" TO 1" SLOPE, (±) NORMAL TO THE DIRECTION OF THE WALL AT THE END OF THE DAM, HAS BEEN APPROXIMATELY DEFINED.

A SECOND NATURAL GROUND DEPRESSION (AUXILIARY SPILLWAY #2) IS FOUND (±) 500' BEYOND AND TO THE RIGHT OF THE FIRST DEPRESSION. ALTHOUGH HEAVILY COVERED BY TALL BRUSH THE OVERFLOW SECTION IS FORMED BY A SILL (±) 0.8' WIDE AT THE CREST (±) ELEV. 179' ASL AND (±) 71' LONG. NO WALLS DEFINE THE END OF THE SILL AND THE GROUND RAISES GRADUALLY TO THE RIGHT AT (±) 4" TO 1" AND TO THE LEFT AT (±) 9" TO 1".

ASSUME DISCHARGE COEFFICIENTS: $C = 3.2$ FOR THE PRINCIPAL SPILLWAY AND $C = 2.0$ FOR THE AUXILIARY SPILLWAYS.

USING THE CREST ELEVATION OF THE PRINCIPAL SPILLWAY AS DATUM (ELEV. 179' ASL) THE TOTAL DISCHARGE OF THE SPILLWAYS IS APPROXIMATED BY:

1') PRINCIPAL SPILLWAY: $(Q_s)_1 = 3.2 \times 63 H^{3/2} = 200 H^{3/2}$

2') AUXILIARY SPILLWAY #1:

SWAGE: $(Q_s)_2 = 2.0 \times 60 (H-1.5)^{3/2} = 120 (H-1.5)^{3/2}$

SLOPING RIGHT SIDE:

* $(L_s)_2 = \frac{3}{2} \left(\frac{L_s}{L_s} \right) (H-1.5) \approx 11$ $(Q_s)_2 = 22 (H-1.5)^{3/2}$

*NOTE: AN EQUIVALENT LENGTH (L_s) WILL BE ASSUMED FOR ALL PORTIONS OF SLOPING TERRAIN.

Project NON-FEDERAL DAMS INSPECTION Sheet D-5 of 7
 Computed By HLL Checked By GRB Date 10/10/79
 Field Book Ref. _____ Other Refs. CE #27-660-HA Revisions _____

MESSERSCHMIDT POND DAM

A, a-corr'd) OVERFLOW RATING CURVE - SPILLWAYS

3') AUXILIARY SPILLWAY #2

SWALE: $(Q_s)_3 = 2.0 \times H(H-1)^{3/2} = 140(H-1)^{3/2}$

SLOPING RIGHT/LEFT SIDES:

$* (L'_{R,L})_3 = \frac{2/3(4+9)(H-1)^{5/2}}{29} \therefore (Q_s')_3 = 18(H-1)^{5/2}$

THEREFORE THE COMBINED DISCHARGE OF THE SPILLWAYS CAN BE APPROXIMATED BY:

$$Q_s = 200H^{3/2} + 120(H-1.5)^{3/2} + 22(H-1.5)^{5/2} + 140(H-1)^{3/2} + 18(H-1)^{5/2}$$

(ii) EXTENSION OF THE RATING CURVE FOR SURCHARGES OVERTOPPING THE DAM.

THE DAM TO THE RIGHT IS AN EARTH EMBANKMENT (+) 345' LONG AND HAS A TOP ELEV. OF (+) 182' MSL.

TO THE LEFT OF THE PRINCIPAL SPILLWAY THERE IS A LOW SECTION OF THE DAM (+) 55' LONG MADE OF CONCRETE RETAINING WALLS AND EARTH FILL WITH TOP ELEV. +180' MSL. EXCEPT FOR (+) 14.5' OF OPEN RETAINING WALL, THE PL. FACE OF THIS SECTION OF THE DAM, SERVES AS FOUNDATION AND/OR WALLS TO A FACTORY BUILDING (RIGHT END) AND TO A SMALLER BUILDING (LEFT END), BOTH PRESENTLY ABANDONED. THE WOODEN FRAME OF THE FACTORY BUILDING ABOVE THE TOP OF THE DAM, SITS OVER A CONCRETE BLOCK BASE, TWO BLOCKS HIGH AND (+) 40.5' LONG. THE ROOF OF THE SMALLER BUILDING SITS OVER A HIGHER SECTION OF WALL (TOP ELEV. (+) 183.2' MSL) (+) 30' LONG WHICH IS APPEN. PERPENDICULAR TO THE LONGITUDINAL AXIS OF THE DAM/SPILLWAY. BEYOND THIS WALL AN EARTH EMBANKMENT (+) 145' LONG FORMS THE REMAINING PORTION OF THE DAM. THE TOP ELEVATION OF THE EMBANKMENT AND THE ADJACENT ROAD AND NATURAL GROUND VARIES

Object NON-FEDERAL DAM: INSPECTION

Sheet D-6 of 17

Computed By WLL

Checked By GAB

Date 10/11/19

Old Book Ref. _____

Other Refs. CE # 27-660-HA

Revisions _____

MESSERSCHMIDT POND DAM

4.2 (cont'd) OVERFLOW RATING CURVE

IN GENERAL, HOWEVER, THIS SECTION RISES FROM (±) ELEV. 182' MSL AT (±) 35' TO 1' SLOPE.

ASSUME C=2.7 FOR THE OVERFLOW AT EMBANKMENTS AND OTHER SECTIONS OF THE DAM.

ALSO, ASSUMING EQUIVALENT LENGTHS FOR THE SLOPING TERRAIN AND NO OVERFLOW (OR NEGLIGIBLE) AT THE EXPECTED SURCHARGE THRU THE PORTION OF DAM OBSTRUCTED BY THE FACTORY BUILDING, THE OVERFLOW CAN BE APPROXIMATED BY THE FOLLOWING EQUATIONS:

1) LEFT EMBANKMENT (ROAD TO BUILDING):

$$L'_{LE} = \frac{2}{3}(35)(H-4) \quad Q'_{LE} = 63(H-4)^{3/2}$$

2) WALL AT ROOF OF SMALL BUILDING:

$$Q_{WR} = 2.7 \times 30(H-5.2)^{3/2} = 81(H-5.2)^{3/2}$$

3) WALL BETWEEN BUILDINGS (LOW SECTION OF DAM):

$$Q_W = 2.7 \times 14.5(H-2)^{3/2} = 39(H-2)^{3/2}$$

4) MAIN EMBANKMENT:

$$Q_0 = 2.7 \times 345(H-4)^{3/2} = 930(H-4)^{3/2}$$

THEREFORE, THE TOTAL OVERFLOW RATING CURVE CAN BE APPROXIMATED BY:

$$Q = Q_0 + 39(H-2)^{3/2} + 930(H-4)^{3/2} + 63(H-4)^{3/2} + 81(H-5.2)^{3/2}$$

WHERE Q_0 (SEE P. D-5) IS THE SPILLWAYS FLOW. THE CORRESPONDING OVERFLOW RATING CURVE IS PLOTTED ON NEXT PAGE.

D-6

Project NON-FEDERAL DAMS INSPECTION

Sheet D-7 of 17

Computed By HLL

Checked By GAB

Date 10/8/79

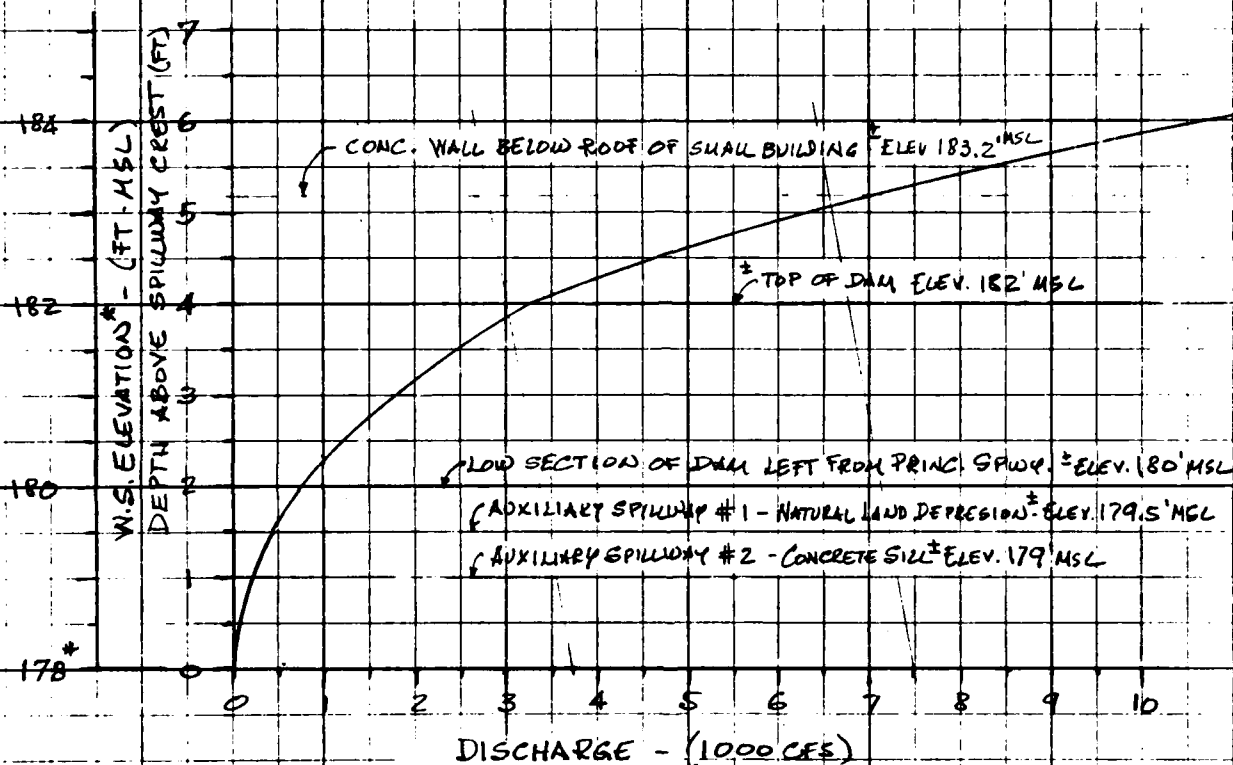
Field Book Ref. _____

Other Refs. CE#27-660-HA

Revisions _____

MEISSERSCHMIDT POND DAM

4.2 (Cont'd) OUTFLOW RATING CURVE



*NOTE: W.S. ELEV. 178' MSL SHOWN ON THE 1958 (PHOTO REV. 1970) USGS ESSEX, CT CIRCULAR SHEET IS ASSUMED TO BE EQUIVALENT TO THE PRINCIPAL SPILLWAY CREST ELEVATION.

AD-A144 666

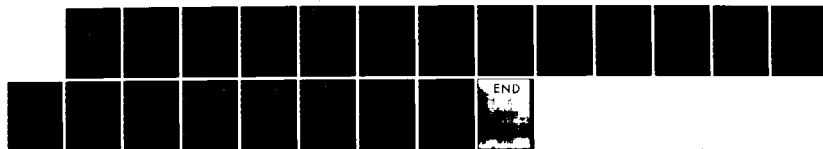
NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
MESSERSCHMIDT POND DA. (U) CORPS OF ENGINEERS WALTHAM
RA NEW ENGLAND DIV NOV 79

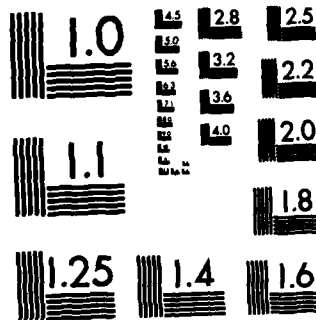
22

UNCLASSIFIED

F/G 13/13

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Project NON-FEDERAL DAMS INSPECTION Sheet D-8 of 17
 Computed By HKP Checked By EAR Date 10/11/79
 Field Book Ref _____ Other Refs CE #27-660-HA Revisions _____

MESSERSCHAIDT POND DAM

4, b) SURCHARGE HEIGHT TO PASS (Q_p)

i) @ $Q_p = PMF = 7500 \text{ cfs}$ $H_s = 5.3'$

ii) @ $Q_p = \frac{1}{2} PMF = 3750 \text{ cfs}$ $H_s = 4.2'$

c) EFFECT OF SURCHARGE STORAGE ON PEAK OUTFLOW

i) ARE LAKE AREA WITHIN EXPECTED SURCHARGE: $\bar{A} = 100 \text{ ac}$
 (SEE STORAGE P. D-2)

ii) ASSUME NORMAL POOL LEVEL AT PRINCIPAL SPILLWAY (REST ELEV. 178' NG)

iii) WATERLINED AREA: D.A. = 4.07 ^{sq mi} (SEE P. D-1)

iv) DISCHARGE (Q_p) AT VARIOUS HYPOTHETICAL SURCHARGE ELEVATIONS

$H = 6'$ $V = 100 \times 6 = 600 \text{ acft}$ $\therefore S = \frac{600}{4.07 \times 53.3} = 2.77''$

$H = 3'$ $V = 300 \text{ acft}$ $\therefore S = 1.38''$

FROM APPROXIMATE STORAGE ROUTING MED-AGE GUIDELINES AND 19"
 MAX. PROBABLE R.O. IN NEW ENGLAND

$Q_p = Q_p' (1 - \frac{S}{19})$ AND FOR $\frac{1}{2} PMF$ $Q_p' = Q_p' (1 - \frac{S}{19.5})$

FOR THE ABOVE HYPOTHETICAL SURCHARGE:

$H = 0'$	$Q_p = 6410 \text{ cfs}$	$Q_p' = 2660 \text{ cfs}$
$H = 3'$	$Q_p = 6950 \text{ cfs}$	$Q_p' = 3200 \text{ cfs}$
AND, FOR: $H = 0$	$Q_p = 7500 \text{ cfs}$	$Q_p' = 3750 \text{ cfs}$

Project NON-FEDERAL DAMS INSPECTION

Sheet D-9 of 17

Computed By HQI

Checked By GAB

Date 10/11/79

Field Book Ref. _____

Other Refs. CE #27-660-HA

Revisions _____

MESSERSCHMIDT POND DAM

4.4) PEAK OUTFLOW (Q_p)

USING NED-ACE GUIDELINES "SURCHARGE STORAGE ROUTING" ALTERNATE METHOD (SEE R D-7)

$$Q_p \approx 6600^{cfs} \quad H_3 \approx 5.1' \text{ FOR } Q_p = PMF$$

$$Q_p' \approx 3060^{cfs} \quad H_3' \approx 3.8' \text{ FOR } Q_p' = \frac{1}{2} PMF$$

NOTE: APPROX THE SAME OUTFLOW/SURCHARGE WILL BE PRODUCED IF THE LOWER PORTION OF THE DAM IS RAISED TO ELEV. 192' MSL.

5) SPILLWAY CAPACITY RATIO TO PEAK INFLOW AND OUTFLOW

a) SPILLWAY CAPACITY TO LOWER PORTION OF DAM ($H=2'$): $Q_s' = 770^{cfs}$

\therefore THE SPILLWAY CAPACITY IS (\pm) 10% OF THE INFLOW (Q_p) AND (\pm) 12% OF THE OUTFLOW (Q_p) AT TEST FLOOD = PMF AND LIKEWISE, IT IS (\pm) 20% OF THE INFLOW (Q_p') AND (\pm) 25% OF THE OUTFLOW (Q_p') AT $\frac{1}{2}$ PMF

b) SPILLWAY CAPACITY TO TEST FLOOD SURCHARGE ($H_3=5.1'$): $Q_s'' \approx 5520^{cfs}$

\therefore THE SPILLWAY CAPACITY AT $H_3=5.1'$ IS (\pm) 74% OF THE INFLOW (Q_p) AND (\pm) 84% OF THE OUTFLOW (Q_p) AT TEST FLOOD = PMF

SIMILARLY, THE SPILLWAY CAPACITY AT $\frac{1}{2}$ PMF SURCHARGE ($H_3'=3.8'$): $(Q_s')' \approx 2970^{cfs}$ IS (\pm) 79% OF THE INFLOW (Q_p') AND (\pm) 97% OF THE OUTFLOW (Q_p') AT $\frac{1}{2}$ PMF.

Project NON-FEDERAL DAMS INSPECTION

Sheet D-10 of 17

Computed By HLM

Checked By GRB

Date 10/11/79

Field Book Ref. _____

Other Refs. CE #27-660-HA

Revisions _____

MESSERSCHMIDT POND DAM

5, c) SPILLWAY CAPACITY TO TOP OF MAIN EMBANKMENT (ELEV. 182' MSL):

$$H = 4' \therefore Q_s'' = 3300 \text{ cfs}$$

THE SPILLWAY CAPACITY TO TOP OF MAIN DAM IS (+) 44% OF THE INFLOW (Q_p) AND (+) 51% OF THE OUTFLOW AT TEST FLOOD = PMF. AND, LIKEWISE, IT IS (+) 88% OF THE INFLOW (Q_p') AND (+) 108% OF THE OUTFLOW (Q_p'') AT 1/2 PMF.

6) SUMMARY AND COMMENTS:

a) PEAK INFLOW: $Q_p = \text{PMF} \approx 7500 \text{ cfs}$

$Q_p' = 1/2 \text{ PMF} = 3750 \text{ cfs}$

b) PEAK OUTFLOW: $Q_p = 6600 \text{ cfs}$

$Q_p' = 3060 \text{ cfs}$

c) SPILLWAY CAPACITY:

(i) TO LOWER PORTION OF DAM: $Q_s' = 770 \text{ cfs}$ OR (+) 12% OF (Q_p) AND (+) 25% OF (Q_p').

(ii) TO TEST FLOOD SURCHARGE: $H_s = 5.1'$; $Q_s'' = 5220 \text{ cfs}$ OR (+) 84% OF (Q_p)
TO 1/2 PMF SURCHARGE: $H_s = 3.8'$; $Q_s'' = 2970 \text{ cfs}$ OR (+) 97% OF (Q_p')

(iii) TO TOP OF MAIN EMBANKMENT: $Q_s'' = 3300 \text{ cfs}$ OR (+) 51% OF (Q_p) AND (+) 108% OF (Q_p')

THEREFORE, AT TEST FLOOD = PMF, THE DAM IS OVERTOPPED TO A DEPTH OF (+) 1.1' OVER THE MAIN EMBANKMENT (U.S. ELEV. 183.1' MSL) AND (+) 3.1' OVER THE LOW SECTION OF THE DAM TO THE LEFT OF THE PRINCIPAL SPILLWAY. THE CORRESPONDING SURCHARGE AT THE PRINCIPAL SPILLWAY IS (+) 5.1' AND AT THE AUXILIARY SPILLWAYS IS, RESPECTIVELY, (+) 4.1' AND (+) 3.6'.

SIMILARLY AT 1/2 PMF, THE DAM IS ONLY OVERTOPPED AT THE LOW SECTION TO A DEPTH OF (+) 1.8' (U.S. ELEV. 181.8' MSL). THE CORRESPONDING SURCHARGE

Project NON-FEDERAL DAMS INSPECTION

Sheet D-11 of 17

Computed By HLL

Checked By GAB

Date 10/11/77

Field Book Ref. _____

Other Refs. CE #27-660-4A

Revisions _____

MESSERSCHMIDT POND DAM

6-Cont'd) SUMMARY AND COMMENTS

AT THE PRINCIPAL SPILLWAY IS (+) 3.8' AND AT THE AUXILIARY SPILLWAYS #1 AND #2 IS, RESPECTIVELY, (+) 2.3' AND (+) 2.8'. THE REMAINING FREEBOARD AT THE MAIN EMBANKMENT IS (+) 0.2'.

MESSERSCHMIDT POND IS CROSSED BY STATE RTE 145 AND JUST $\frac{1}{2}$ FROM THIS CROSSING, BY ANOTHER EMBANKMENT WHICH KEEPS THE U/S W.S. OF A SMALL PORTION ($\pm 3\%$) OF THE RESERVOIR AT SLIGHTLY HIGHER LEVEL. THE CONTROL TO THE PEAK INFLOW (CONSIDERED IN THIS CASE NEGLECTABLE) IMPOSED BY THESE MAN-MADE STRUCTURES WHOSE STRUCTURAL CONDITION TO WITHSTAND A DIFFERENTIAL HEAD IS UNKNOWN HAS NOT BEEN INCLUDED IN THE ANALYSIS.

THE DAM HAS A SLUICeway (+) 5.5' WIDE X 19.5' LONG AND BOTTOM AT ELEV. (+) 170' W.S. THIS SLUICeway WHICH IS PRESENTLY CLOSED BY STOP RAILS TO (+) ELEV. 179.5' HOLDS THE TRASHRACKS AND SERVES AS THE INLET WORKS TO A TURBINE AT THE FACTORY BUILDING FED BY A 3' DIA. PENSTOCK, (+) 10' LONG. PRESENTLY THE TURBINE IS NOT OPERATING. DETAILS OF THIS FLOW WAY TO THE TAILRACE ARE NOT AVAILABLE TO ESTIMATE ITS ACTUAL CAPACITY WHEN THE TURBINE IS BYPASSED. THE PENSTOCK CAPACITY UNDER A HEAD OF (+) 10' IS ESTIMATED AT (+) 20 CFS.

Project NON-FEDERAL DAMS INSPECTION

Sheet D-12 of 17

Computed By KH

Checked By ELC

Date 10/4/79

Field Book Ref.

Other Refs. CE #27-660-HA

Revisions 12/12/79

MESYERSCHMIDT POND DAM

II) DOWNSTREAM FAILURE HAZARD

1) PEAK FLOOD AND STAGE IMMEDIATELY $\frac{1}{2}$ FROM DAM

a) BREACH WIDTH

i) MID-HEIGHT (\pm) $24' \times 168' \text{ HSL}$ $(180 - \frac{24}{2} = 168')$ *See "Height" P.D-2 AND NOTE ON P.D-1

ii) APPROX. MID-HEIGHT LENGTH $L = 330'$ (SEE FIELD INSPECTION)

iii) BREACH WIDTH (SEE NED-ACE $\frac{1}{2}$ DAM FAILURE GUIDELINES)

$$W = 0.4 \times 330 = 132' \quad \text{ASSUME } W_b = 130'$$

b) PEAK FAILURE OUTFLOW (Q_b)

ASSUME SURCHARGE TO LOWER SECTION OF DAM (EL. 180' HSL)

i) HEIGHT AT TIME OF FAILURE: $Y_o = 24'$

ii) SPILLWAYS DISCHARGE: $Q_s = 770 \text{ CFS}$

iii) BREACH OUTFLOW** (Q_b):

$$Q_b = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2} = 25700 \text{ CFS}$$

iv) PEAK FAILURE OUTFLOW (Q_f): $Q_f = Q_s + Q_b = 26500 \text{ CFS}$

c) FLOOD DEPTH** IMMEDIATELY $\frac{1}{2}$ FROM DAM: $Y = 0.44 Y_o = 10.6'$

** FROM RETREATING SURGE THEORY APPLIED TO DAM FAILURE CONDITIONS.

Project FEDERAL DAMS INSPECTION

Sheet D-13 of 17

Computed By WLP

Checked By GAB

Date 10/11/79

aid Book Ref.

Other Refs. CE #27-660-114

Revisions

MESSERSCHMIDT POND DAM

2) ESTIMATE OF $\frac{1}{2}$ DAM FAILURE CONDITIONS AT IMPACT AREA:

(SEE NED-ACE GUIDELINES FOR ESTIMATING $\frac{1}{2}$ DAM FAILURE HYDROGRAPHS)

a) REACH BETWEEN MESSERSCHMIDT POND AND WRIGHTS POND:

THE (±) 3000' LONG REACH OF FALLS RIVER $\frac{1}{2}$ FALLS MESSERSCHMIDT POND TO WRIGHTS POND IS APPROX. V-SHAPED WITH (±) 40" TO 1" AND 6" TO 1" SIDE SLOPES TO A DEPTH OF (±) 20' AND SLOPES AT (±) 1.3%.

i) MESSERSCHMIDT POND STORAGE AT TIME OF FAILURE (SEE P. D-2):

$$S = 700 + 2 \times 100 = 900 \text{ ACFT} \quad (S/2 = 450 \text{ ACFT})$$

ii) PEAK INFLOW TO WRIGHTS POND DUE TO BREACH OF MESSERSCHMIDT DAM:

$$(Q_p) = 26,500 \text{ CFS} \therefore y_1 = 10.6'; V_1 = 178 \text{ ACFT} \leq \frac{S}{2} \text{ (ON REACH OF 3000'; } \eta = 0.50)$$

$$Q_p = Q_p \left(1 - \frac{V}{S}\right) = 21,300 \text{ CFS} \therefore y_2 = 9.7'; V_2 = 151 \text{ ACFT}; V = 164 \text{ ACFT} \therefore (Q_p) = 21,700 \text{ CFS}$$

$$\text{PEAK INFLOW TO WRIGHTS POND: } (Q_p)_{WP} = 21,700 \text{ CFS} \quad y = 9.8'$$

b) PEAK OUTFLOW FROM WRIGHTS POND

i) WRIGHTS POND IS A (±) 40^{AC} LAKE WITH A BROAD CRESTED SPILLWAY (±) 100' LONG, (±) 12' WIDE. THE HEIGHT FROM THE SPILLWAY TO THE TOP OF THE EARTH EMBANKMENT (±) 200' LONG) WHICH FORMS THE REMAINDER OF THE DAM IS (±) 2.5'. BEYOND THE DAM, THE TERRAIN TO THE LEFT RISES AT (±) 3" TO 1" SLOPE AND TO THE RIGHT AT 4" TO 1" SLOPE. 50' TO 100' FROM THE DAM A HOUSE HAS ITS FLOOR AT APPROX.

Non-Federal Dams Inspection

Sheet D-14 of 17

Computed By HGL

Checked By GRS

Date 10/12/77

Book Ref.

Other Refs. CE# 27-660-11A

Revisions

MEISSERSCHMIDT POND DAM

2, b-Cont'd) PEAK OUTFLOW FROM WRIGHTS POND

THE SAME ELEVATION OF THE SPILLWAY CREST ALTHOUGH THE HOUSE IS HIGH (1st) 10' TO 15' ABOVE THE CHANNEL. (CE FIELD INSP. 9/18/77)

(i) OVERFLOW RATING CURVE:

ASSUME $C = 3.2$ FOR THE SPILLWAY OVERFLOW

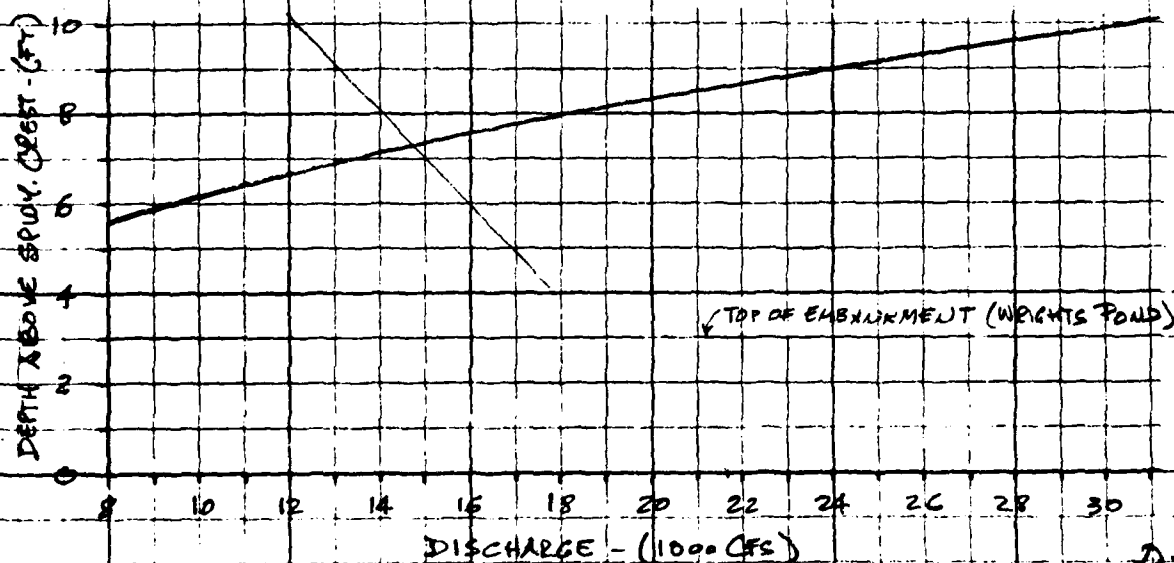
$C = 2.5$ FOR THE DAM AND SIDE SLOPES OVERFLOW

ASSUME ALSO, AN EQUIVALENT LENGTH $(L' = \frac{2}{5}(39)(H-2.5))$ FOR THE SLOPING TERRAIN.

∴ THE OVERFLOW CAN BE APPROXIMATED BY:

$$Q_{WP} = 320H^{3/2} + 500(H-2.5)^{3/2} + 65(H-2.5)^{5/2}$$

THE CORRESPONDING OVERFLOW RATING CURVE FOR WRIGHTS POND IS AS FOLLOWS:



D-14

Project NON-FEDERAL DAMS INSPECTION

Sheet D-15 of 17

Computed By WLL

Checked By GRB

Date 12/12/77

Field Book Ref. _____

Other Refs. CE #27-660-HA

Revisions _____

MESSERSCHMIDT POND DAM

2.6-Cont'd) PEAK OUTFLOW FROM WRIGHTS POND

(iii) PEAK OUTFLOW:

NOTE: SEE GRAPHICAL ROUTING ON RATING CURVE (P.D-16).

FOR THE HYPOTHETICAL DEPTHS:

$$H = 10' \quad V = 40 \times 10 = 400 \text{ FT}^2 \quad Q_H = Q_R \left(1 - \frac{V}{5}\right) = 12060 \text{ CFS}$$

$$H = 0 \quad Q_H = 21700 \text{ CFS}$$

$$\therefore (Q)_{\text{INF}} = 14700 \text{ CFS} \quad ; \quad (H_3)_{\text{WRD}} = 7.3' \quad (\text{DAM OVERTOPPED } \approx 4.8')$$

C) REACH BETWEEN WRIGHTS POND AND POTENTIAL IMPACT AREA

NOTE: ALTHOUGH THE HOUSE IMMEDIATELY N FROM WRIGHTS POND WOULD PROBABLY BE AFFECTED UPON FAILURE OF MESSERSCHMIDT DAM BY FLOODING FROM THE OVERTOPPING OF WRIGHTS POND DAM, AND THEREFORE, IT CONSTITUTES AN IMMEDIATE IMPACT AREA, THE ANALYSIS WILL BE CARRIED (+) 1200' N WHERE TWO OTHER LOW HOUSES WERE FOUND DURING THE FIELD INSPECTION OF 9/18/77 (SEE "HAZARD POTENTIAL" P.D-2)

N FROM WRIGHTS POND, THE FALLS RIVER CHANNEL OPENS INTO A WIDE VALLEY FORMING A (+) TRAPEZOIDAL SECTION, (+) 100' WIDE AT THE BASE WITH (+) 150" TO 1" AND 50" TO 1" SIDE SLOPES AND (+) 0.4% LONGITUDINAL SLOPE.

$$C) \text{ PEAK INFLOW TO REACH: } (Q_R)_2 = 14700 \text{ CFS}$$

Project NON-FEDERAL DAMS INSPECTION

Sheet D-16 of 17

Computed By WHL

Checked By GRB

Date 10/12/79

Field Book Ref. _____

Other Refs CE# 27-660-HA

Revisions _____

MESSERSCHMIDT POND DAM

2.c-Cont'd) REACH BETWEEN WRIGHTS POND AND POTENTIAL IMPACT AREA

(i) APPROXIMATE STAGE AT POTENTIAL IMPACT AREA AFTER FAILURE:

$$(Q_p)_2 = 14700 \text{ cfs} \therefore y_1 = 5.8'; V_1 = 99 \frac{\text{ft}}{\text{s}} \frac{1}{2} \frac{5}{2} \text{ (ON REACH OF 1200'; } \eta = 0.050)$$

$$Q_p = Q_p (1 - \frac{V}{5}) = 13100 \text{ cfs} \therefore y_2 = 5.6'; V_2 = 92 \frac{\text{ft}}{\text{s}}; V = 96 \frac{\text{ft}}{\text{s}} \therefore (Q_p)_2 = 13100 \text{ cfs}$$

$$\therefore \text{REACH OUTFLOW: } Q_p = 13100 \text{ cfs} \quad \text{STAGE: } y_2 = 5.6'$$

d) APPROXIMATE STAGE BEFORE FAILURE:

$$\text{MESSERSCHMIDT SPILLWAY OVERFLOW: } Q_1 = 770 \text{ cfs} \quad y = 1.6'$$

$$\text{e) RAISE IN STAGE AT IMPACT AREA: } \Delta y = 4'$$

3) SUMMARY:

$$\text{a) PEAK FAILURE OUTFLOW: } Q_p = 26500 \text{ cfs} \quad y_1 = 10.6'$$

$$\text{b) REACH OUTFLOW/INFLOW TO WRIGHTS POND: } (Q_p)_{WP} = 21700 \text{ cfs} \quad y = 9.8'$$

$$\text{c) PEAK OUTFLOW FROM WRIGHTS POND: } (Q_p)_{WP} = 14700 \text{ cfs} \quad (H_p)_{WP} = 7.3' \\ \text{(DAM OVERTOPPED BY (+) 4.8')}$$

d) CONDITIONS AT POTENTIAL IMPACT AREA:

$$\text{(i) APPROXIMATE STAGE BEFORE FAILURE: } y = 1.6' \quad (Q_p = 770 \text{ cfs})$$

$$\text{(ii) APPROXIMATE STAGE AFTER FAILURE OF MESSERSCHMIDT POND DAM: } y = 5.6' \quad (Q_p = 13100 \text{ cfs})$$

Project NON-FEDERAL DAMS INSPECTION

Sheet D-17 of 17

Computed By HLL

Checked By JAB

Date 10/12/77

Field Book Ref. _____

Other Refs. CE #27-660-HA

Revisions _____

MESSERSCHAUMT POND DAM

3.d (Cont'd) SUMMARY - CONDITIONS AT POTENTIAL IMPACT AREA:

(iii) APPROXIMATE RAISE IN STAGE AFTER FAILURE $\Delta Y \approx 4'$

NOTE: A SIMILAR BREACH ANALYSIS, ASSUMING FAILURE WITH SUR-
CHARGE TO TOP OF MAIN EMBANKMENT (B. ICM WIDTH (I) THE SAME)

GIVES: a) HEIGHT AT TIME OF FAILURE $Y_0 = 26'$; b) SPILLWAYS DISCH. $Q_{S0} \approx 3300 \text{ cfs}$;
c) BREACH OUTFLOW: $Q_1 \approx 29000 \text{ cfs}$; d) PEAK FAILURE OUTFLOW $Q_p \approx 32300 \text{ cfs}$;
e) FLOOD DEPTH IMM. PK FROM DAM: $Y \approx 11.4'$

f) PEAK OUTFLOW/INFLOW TO WRIGHTS POND: $(Q_2)_{WP} \approx 86700 \text{ cfs}$ $Y \approx 10.6'$

g) PEAK OUTFLOW FROM WRIGHTS POND: $(Q_3)_{WP} \approx 21400 \text{ cfs}$ $(H_3)_{WP} \approx 8.6'$
(WRIGHTS POND OVERTOWNED (I) 6.1')

h) CONDITIONS AT POTENTIAL IMPACT AREA: (i) APPROX. STAGE BEFORE

FAILURE: $Y \approx 3.1'$ ($Q_{I0} \approx 3300 \text{ cfs}$); (ii) APPROX. STAGE AFTER

FAILURE: $Y \approx 6.4'$ ($Q_{I3} \approx 18700 \text{ cfs}$); (iii) RAISE IN STAGE AT IMPACT

AREA: $\Delta Y \approx 3.3'$

PRELIMINARY GUIDANCE
FOR ESTIMATING
MAXIMUM PROBABLE DISCHARGES
IN
PHASE I DAM SAFETY
INVESTIGATIONS

New England Division
Corps of Engineers

March 1978

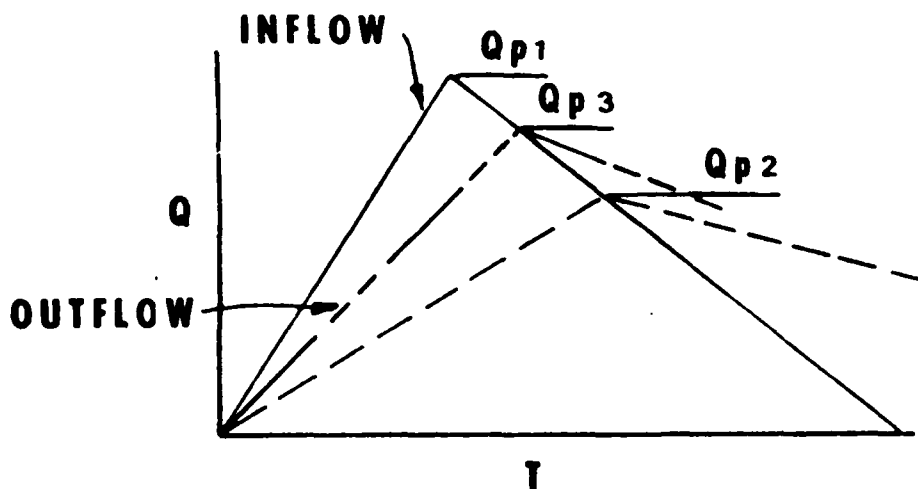
MAXIMUM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

<u>Project</u>	<u>Q</u> (cfs)	<u>D.A.</u> (sq. mi.)	<u>MPF</u> cfs/sq. mi.
1. Hall Meadow Brook	26,600	17.2	1,546
2. East Branch	15,500	9.25	1,675
3. Thomaston	158,000	97.2	1,625
4. Northfield Brook	9,000	5.7	1,580
5. Black Rock	35,000	20.4	1,715
6. Hancock Brook	20,700	12.0	1,725
7. Hop Brook	26,400	16.4	1,610
8. Tully	47,000	50.0	940
9. Barre Falls	61,000	55.0	1,109
10. Conant Brook	11,900	7.8	1,525
11. Knightville	160,000	162.0	987
12. Littleville	98,000	52.3	1,870
13. Colebrook River	165,000	118.0	1,400
14. Mad River	30,000	18.2	1,650
15. Sucker Brook	6,500	3.43	1,895
16. Union Village	110,000	126.0	873
17. North Hartland	199,000	220.0	904
18. North Springfield	157,000	158.0	994
19. Ball Mountain	190,000	172.0	1,105
20. Townshend	228,000	106.0(278 total)	820
21. Surry Mountain	63,000	100.0	630
22. Otter Brook	45,000	47.0	957
23. Birch Hill	88,500	175.0	505
24. East Brimfield	73,900	67.5	1,095
25. Westville	38,400	99.5(32 net)	1,200
26. West Thompson	85,000	173.5(74 net)	1,150
27. Hodges Village	35,600	31.1	1,145
28. Buffumville	36,500	26.5	1,377
29. Mansfield Hollow	125,000	159.0	786
30. West Hill	26,000	28.0	928
31. Franklin Falls	210,000	1000.0	210
32. Blackwater	66,500	128.0	520
33. Hopkinton	135,000	426.0	316
34. Everett	68,000	64.0	1,062
35. MacDowell	36,300	44.0	825

MAXIMUM PROBABLE FLOWS
BASED ON TWICE THE
STANDARD PROJECT FLOOD
(Flat and Coastal Areas)

<u>River</u>	<u>SPF</u> (cfs)	<u>D.A.</u> (sq. mi.)	<u>MPF</u> (cfs/sq. mi.)
1. Pawtuxet River	19,000	200	190
2. Mill River (R.I.)	8,500	34	500
3. Peters River (R.I.)	3,200	13	490
4. Kettle Brook	8,000	30	530
5. Sudbury River.	11,700	86	270
6. Indian Brook (Hopk.)	1,000	5.9	340
7. Charles River.	6,000	184	65
8. Blackstone River.	43,000	416	200
9. Quinebaug River	55,000	331	330

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Q_{p1}) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass " Q_{p1} ".

b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefore:

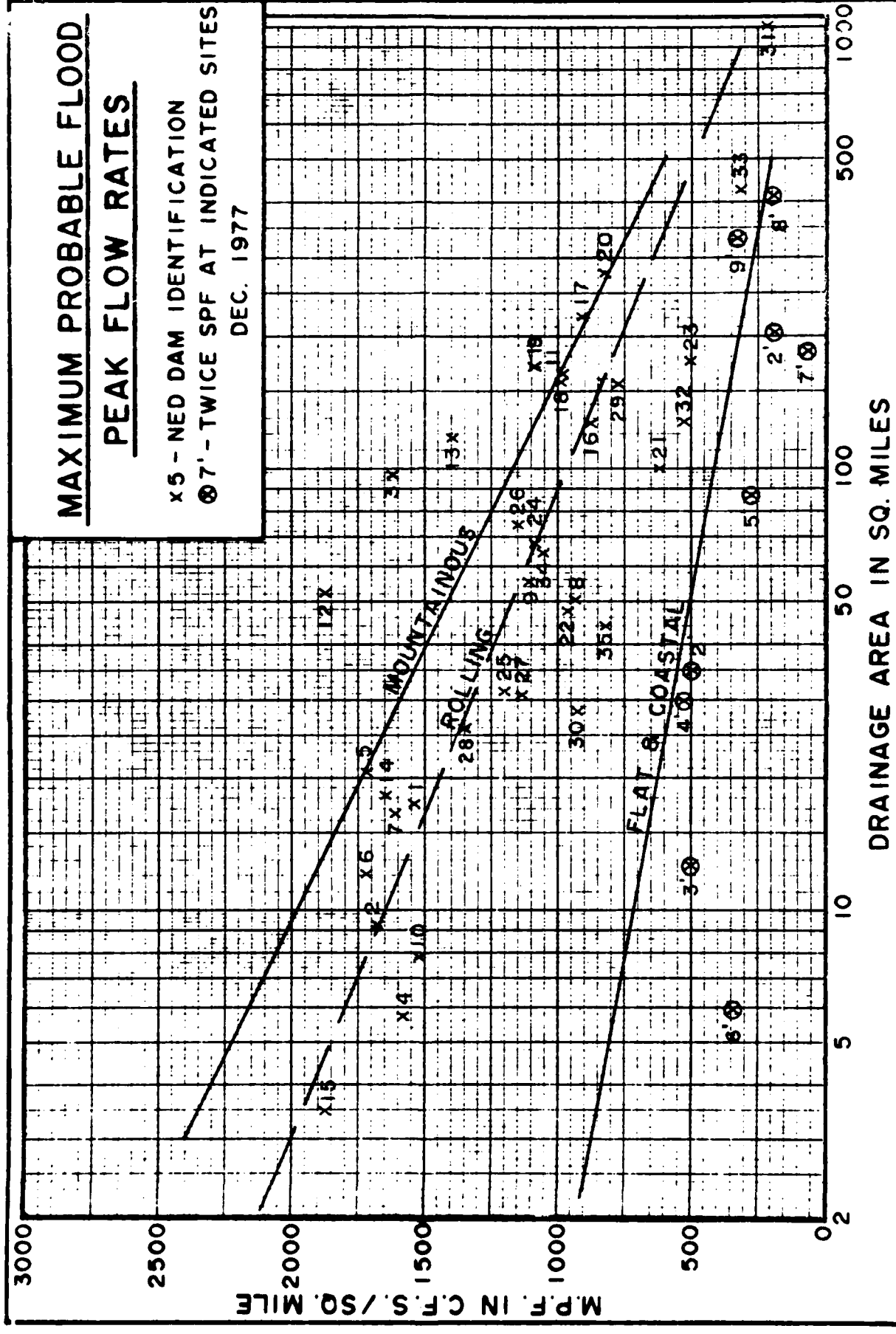
$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and " $STOR_2$ " To Pass " Q_{p2} "

b. Average " $STOR_1$ " and " $STOR_2$ " and Determine Average Surcharge and Resulting Peak Outflow " Q_{p3} ".

MAXIMUM PROBABLE FLOOD PEAK FLOW RATES

x5 - NED DAM IDENTIFICATION
 ⊗ 7' - TWICE SPF AT INDICATED SITES
 DEC. 1977



SURCHARGE STORAGE ROUTING SUPPLEMENT

**STEP 3: a. Determine Surcharge Height and
"STOR₂" To Pass "Q_{p2}"**

**b. Avg "STOR₁" and "STOR₂" and
Compute "Q_{p3}".**

**c. If Surcharge Height for Q_{p3} and
"STOR_{avg}" agree O.K. If Not:**

**STEP 4: a. Determine Surcharge Height and
"STOR₃" To Pass "Q_{p3}"**

**b. Avg. "Old STOR_{avg}" and "STOR₃"
and Compute "Q_{p4}"**

**c. Surcharge Height for Q_{p4} and
"New STOR_{avg}" should Agree
closely**

SURCHARGE STORAGE ROUTING ALTERNATE

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{\text{STOR}}{19} \right)$$

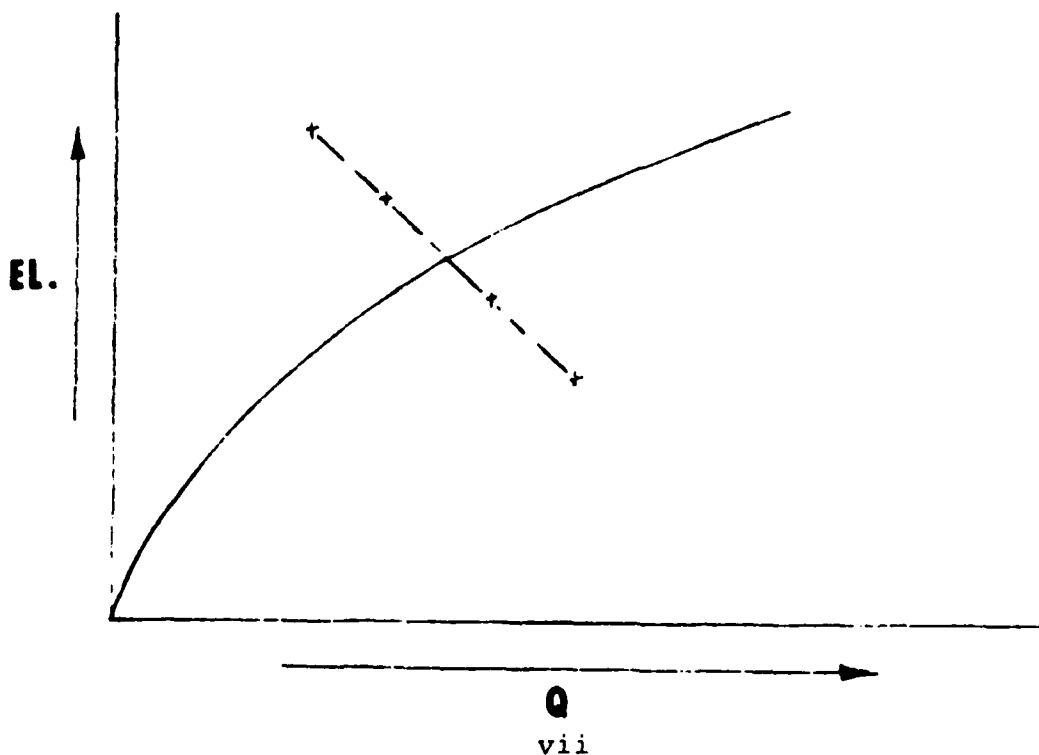
$$Q_{p2} = Q_{p1} - Q_{p1} \left(\frac{\text{STOR}}{19} \right)$$

FOR KNOWN Q_{p1} AND 19" R.O.

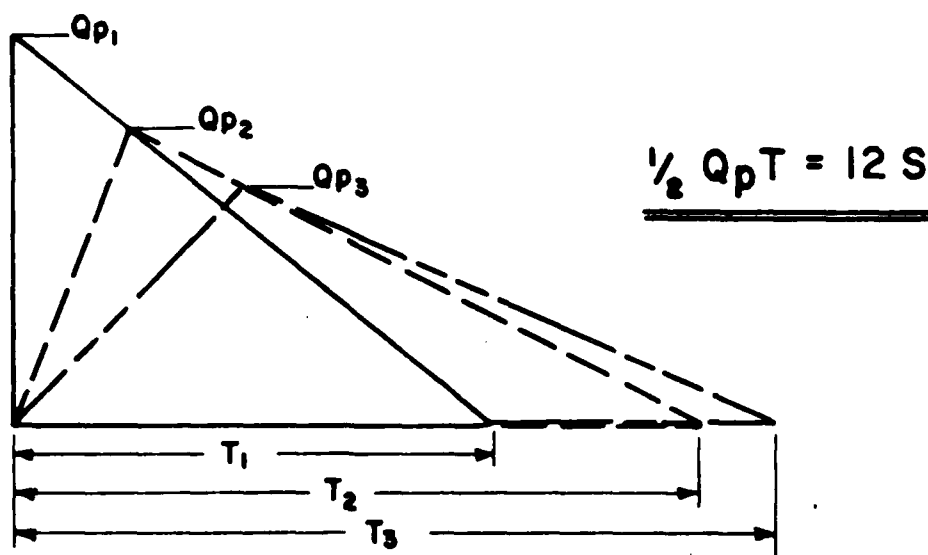
Q_{p2}
=====

STOR
=====

EL.
=====



"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Q_{p1} = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOMPANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2} .

$$Q_{p2} (\text{TRIAL}) = Q_{p1} \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2} .

$$Q_{p2} = Q_{p1} \left(1 - \frac{V_{\text{avg}}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

APPENDIX E

INFORMATION AS CONTAINED IN
THE NATIONAL INVENTORY OF DAMS

INVENTORY OF DAMS IN THE UNITED STATES

IDENTITY NUMBER	STATE	COUNTY	DIST.	CONSTR. DIST.	COUNTY	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY MO YR
CT 392	NEO	CT	007	02		MESSERSCHMIDT POND DAM	4120.3	7229.0	190CT79

POPULAR NAME	NAME OF IMPONDMENT
	MESSERSCHMIDT POND

REGION	RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST. FROM DAM (MI.)	POPULATION
01 04	FALLS RIVER	WESTHOOK	0	3820

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STORAGE CAPACITY		IMPOUNDING CAPACITIES	
			MAXIMUM (ACFT.)	HYDRAULIC HEIGHT	MAXIMUM (ACFT.)	NET SMV
HEPGOT	1900	0	26	24	910	700

DIST. OWN. FED. H. PRV. FED. SCS. A. VER. DATE

NED. N. N. N. N. N. N.

REMARKS
PI-STONE WALLS WITH EARTH FILL 23-NONE

D/S HAS	SPILLWAY TYPE	MAXIMUM DISCHARGE (ICV)	VOLUME OF DAM (ICV)	POWER CAPACITY (MW)	INSTALLED	PROPOSED	NAVIGATION LOCKS	
							NO.	LENGTH (FT.)
1	545 U	63	779					

OWNER	ENGINEERING BY	CONSTRUCTION BY
CHARLES MESSERSCHMIDT JR		

REGULATORY AGENCY		
DESIGN	CONSTRUCTION	OPERATION
	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY MO YR	AUTHORITY FOR INSPECTION
CANN ENGINEERS INC	14SEP79	PL92-367

REMARKS

END

FILMED

DTIC